

## **New taxa and notes on some previously described species of scaly crickets from South East Asia (Orthoptera, Grylloidea, Mogoplistidae, Mogoplistinae)**

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**New taxa and notes on some previously described species of scaly crickets from South East Asia (Orthoptera, Grylloidea, Mogoplistidae, Mogoplistinae).** - The Mogoplistinae of SE Asia are reviewed. A key to the genera in SE Asia is given. The genera are diagnosed. Two genera are described as new: *Apterornebius* gen. n. and *Terraplistes* gen. n. Keys to the species of the genera *Ornebius* Guérin-Méneville, 1844, *Ectatoderus* Guérin-Méneville, 1847, *Apterornebius* gen. n., *Gotvendia* Bolívar, 1927, *Cycloptiloides* Sjöstedt, 1909, and *Terraplistes* gen. n. are provided. The male phallic complex, male and female supra-anal plate, modification of the paraprocts, the ovipositor apical valves, and the maxillary palps are used as main diagnostic characters. 35 species are described as new: *Ornebius pullus* sp. n. (Brunei); *Ornebius cibodas* sp. n., *Ornebius samudra* sp. n., *Ornebius imitatus* sp. n., *Ornebius bogor* sp. n. (Java); *Ornebius citrus* sp. n. (Sabah); *Ornebius albipalpus* sp. n. (Singapore); *Ornebius dumoga* sp. n., *Ornebius consternus* sp. n. (Sulawesi); *Ornebius aureus* sp. n., *Ornebius serratus* sp. n., *Ornebius angustus* sp. n., *Ornebius tuberculatus* sp. n., *Ornebius peniculatus* sp. n., *Ornebius brevipalpus* sp. n. (Thailand); *Apterornebius kinabalu* sp. n. (Sabah); *Apterornebius chong* sp. n. (Thailand); *Ectatoderus samui* sp. n., *Ectatoderus argentatus* sp. n. (Thailand); *Gotvendia erawan* sp. n. (Thailand); *Micronebius lineatus* sp. n. (Sabah); *Micronebius cylindricus* sp. n. (Singapore); *Micronebius maninjau* sp. n. (Sumatra); *Micronebius insularis* sp. n., *Micronebius laem* sp. n., *Micronebius inopinatus* sp. n. (Thailand); *Cycloptiloides timah* sp. n. (Singapore); *Cycloptiloides pui* sp. n., *Cycloptiloides pakchong* sp. n., *Cycloptiloides lobicauda* sp. n. (Thailand); *Terraplistes chantri* sp. n., *Terraplistes kradung* sp. n., *Terraplistes erawan* sp. n., *Terraplistes brevicauda* sp. n., and *Terraplistes excisa* sp. n. (Thailand). Four new combinations are proposed: *Micronebius sandrasagarai* (Fernando, 1957) comb. n. from *Ectatoderus*, *Micronebius brevipalpis* (Chopard, 1930) comb. n. from *Ornebius*, *Micronebius incertus* (Ingrisch, 1998) comb. n. from *Derectaotus*, *Terraplistes niger* (Ingrisch, 1987) comb. n. from *Cycloptiloides*; [*Ectatoderus pallidigeniculatus* Brunner, 1893 probably also belongs to *Micronebius*]. Types

of the new species are in the museums in Bonn, Geneva or London. Notes on some previously described species are given. For five species (*Ornebius aureus*, *O. samudra*, *Ectatoderus argentatus*, *Micrornebius inopinatus*, and *M. maninjau*) stridulation is also described.

**Keywords:** Grylloidea - Mogoplistinae - South East Asia - diagnostic characters - new taxa - keys to genera and species.

## INTRODUCTION

The scaly crickets or Mogoplistinae are characterised by the integument being covered by scales. They were given full family status since the phylogenetic studies of Desutter (1987). Apart from the typical subfamily, the family Mogoplistidae includes also the Myrmecophilinae. The Mogoplistinae have the greatest species diversity in the tropics with few species living in temperate climates. They are usually not well represented in collections. 57 valid species are currently listed from the Indo-Malayan region (Otte *et al.*, 2005). However, recent studies showed that the Mogoplistinae are second dominant in individuals of Orthoptera in the canopy layer at the Kinabalu area in Sabah, exceeded in numbers only by the tree crickets (Podoscirtinae) (Floren *et al.*, 2001).

Mogoplistinae live in all strata from the tree canopy to the litter on soil in forests. Some of the tree living species belong to the most colourful crickets while ground dwellers or minute forms are often uniformly black or brown. Mogoplistinae are small crickets with a body length of about between four and thirteen mm. Only in the Myrmecophilinae or Tridactylidae we found smaller Orthopterans. The male genitals differ somewhat from the situation in the true crickets (Desutter, 1987), but they were not extensively studied so far with the exception of the Taiwanese species (Yang & Yen, 2001a). Often the sclerotised structures of the phallus are simpler than in true crickets and in some taxa missing at all. In many Mogoplistinae the paraprocts are modified in the male and less often also in the female. These structures are helpful for identification, but their function is unknown.

The aim of the present paper is to record and describe Mogoplistinae originating from field work by different research groups in South East Asia. Most of the taxa are new to science. As there is no modern revision of the Mogoplistinae, Chopard (1969) was followed as far as possible in generic arrangement. Although some of the species rich and widespread genera as *Ornebius*, *Ectatoderus* or *Cycloptiloides* are probably not monophyletic, to revise them would require a much more comprehensive material than currently available. However for few genera a redefinition becomes necessary together with a re-arrangement of some species. Moreover, two genera had to be described as new to accommodate the species at hand.

## MATERIAL AND METHODS

The specimens studied come from four sources (with depositories):

- Studies on the canopy fauna in Sabah; research project of Dr A. Floren, University Wuerzburg; voucher specimens mainly in ZFMK Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany



- Studies of the soil fauna in SE Asia (Sabah, Brunei, Indonesia, Singapore); expeditions by Dr B. Hauser and Dr Ch. Lienhard; voucher specimens in MHNG Muséum d'histoire naturelle, Geneva, Switzerland
- Studies on the canopy fauna in northern Sulawesi; research project of Prof. Nigel Stork; voucher specimens in BMNH, The Natural History Museum, London, U.K.
- Own intermittent expeditions in SE Asia; primary type specimens in ZFMK, others partly in CI Collection Ingrisch

Additional depositories:

- EMBT Department of Agriculture, Bangkok, Thailand  
 MBBJ Museum Zoologicum Bogoriense, Cibinong, Indonesia  
 MNHN Muséum National d'Histoire Naturelle, Paris, France  
 SMF Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt, Germany

Measurements were done with a micrometer under a stereo microscope. If not otherwise mentioned, measurements refer to the length of the body parts. Pencil drawings were done using a camera lucida connected to a stereo microscope, scanned into a computer and processed to vector graphics with graphic software.

Recording of sounds were done with caged specimens using a portable cassette recorder or a DAT recorder.

Analysis of stridulation was done using AmadeusII software on a Mac computer. Frequency windows are «Blackman» calculated as means of a series of pulses. Terminology of crickets songs follows Otte (1992).

## RESULTS

### MAIN DIFFERENTIAL CHARACTERS

#### *Supra-anal plate*

The tenth abdominal tergite in Mogoplistinae deviates from the preceding tergites in that it is distinctly narrower and more or less modified. It forms a supra-anal plate together with the epiproct. In some species both parts are still identifiable as separate segments while in others tenth abdominal tergite and epiproct are completely fused. In this paper, supra-anal plate refers to the unit of tenth abdominal tergite plus epiproct, while mention them separately refers to its parts. Namely in the genus *Ornebius* shape and colour pattern of the supra-anal plate proved to be a helpful diagnostic character in both sexes. The supra-anal plate carries setose areas, a few very long bristles and in some species brushes of hairs that may be used as diagnostic characters.

#### *Paraproct*

In many male Mogoplistinae the paraprocts are modified, possessing an appendage at the internal ventral end. It has been suspected that the process of the male paraproct could have to do with copulation, accordingly the terms «titillator» (Love & Walker, 1979) or «genital process» (Otte & Alexander, 1983) have been applied to it. Here the neutral term «paraproct process» is used.

Also in the female of some species the paraprocts can be modified, carrying a longitudinal carina along its lateral margin. It is possible that the carinae serve as guide bars for the ovipositor.

### *Male phallic complex*

The male phallic complex of Mogoplistinae is still insufficiently studied. Desutter (1987, 1988) in her comprehensive study of the phallic complex in Grylloidea included only a single example from Mogoplistinae (*Arachnocephalus breviceps* [Chopard, 1929]) and describes its phallus very short and schematic. The most comprehensive study so far is that of Yang & Yen (2001a) who describe and figure the phallic complex for all Taiwanese Mogoplistinae. Descriptions and figures for single or few taxa can also be found in other publications (e.g. Gorochov, 1984, 1995, 1996, Ingrisch, 1998, Ichikawa *et al.*, 2000, Gorochov & Marshall, 2001, Bland & Desutter-Grandcolas, 2003). As the terminology differs between authors, I use a pragmatic way to describe the phallic complex. Large parts of the male phallic complex are membranous and as such only well conserved if the specimens are stored in ethanol.

Three major lobes can be observed (Figs 139-146). The dorsal part of the phallus is the epiphallus or epiphallic lobe. This is completely membranous. In a single species I found a minute sclerite on the underside of the epiphallic lobe.

The central lobe comprises the ectophallus and endophallus. It can also be membranous to a large extend, but here is where sclerotisation occurs. The apical area of the central lobe usually consists of a pair of lateral and a pair of medial valves. The lateral valves are membranous but have the internal or external surface sclerotised to a variable extend. Those sclerites are referred to as the external sclerites. The medial valves are usually sclerotised to a large extend. These sclerites are here referred to as internal sclerites. They may stuck in a common membranous sheath or become fused in apical area. These sclerites are elongate and often curved at base to embrace the spermatophore sac. The internal sclerites embrace in between a channel, probably the ejaculatory duct. The ejaculatory duct may be sclerotised of its own thus that an unpaired sclerite appears in between the internal sclerites.

The ventral lobe of the phallic complex is completely membranous. In some species it can be very huge and further differentiated.

The above description applies mainly to the *Ornebius* species studied by myself. Usually the internal sclerites are the most distinct sclerotised parts found in the phallic complex. However, in the genera *Micronebius* and *Cycloptiloides* the affiliation of the sclerotisation in the phallic complex is not always clear as probably reductions occurred due to their minute size. In two genera, *Gotvandia* and *Terraplistes*, no phallic sclerites were found. As the specimens were dry conserved, the membranous structures were not well conserved either.

For some species which were originally conserved in ethanol, the phallus complex was studied before and after cleaning in KOH solution. As sclerotisation of several structures is rather weak or limited to small areas of otherwise membranous structures, the aspect of the phallus complex before and after cleaning may be quite different. Examples are given for some *Ornebius* species (Figs 139-159).

*Ovipositor apical valves*

The apical valves of the ovipositor have often smooth margins and an acute apex. In some species, the ventral margin of the ventral or of the dorsal valves may be serrulate, also the dorsal margin may be finely serrulate. In one species, the ventral margin of the dorsal valves is lobular. Additionally, the apical valves carry a series of short or sometimes long hairs or bristles. Their arrangement, length and the place where they rise (e.g. ventral hairs from ventral margin of dorsal valves or from ventral valves) is in some cases helpful for identification.

*Maxillary palps*

The maxillary palps differ between species by the general length, the relative length of the three apical segments to each other, and the degree of widening of the apical segment.

*Colour pattern*

Many species of Mogoplistinae show a striking colouration with distinctive pattern, especially when the scales are well preserved. The colour pattern seems to be fairly stable in the few species for which large series of specimens were available for study. Although colouration should not be used as an argument for the description of new species as colour polymorphism might occur, colouration is a helpful character for identification and co-ordination of male and female where more than one species of the same genus occur in the same locality.

## SYSTEMATIC PART

*Key to the genera of Mogoplistinae in South East Asia*

Although the key covers both sexes, it is not possible to separate females of *Ornebius* from *Ectatoderus* and of *Gotwendia* from *Derectaotus* as currently understood.

- 1 Anterior tibia with internal tympanum. Males with wings reduced to stridulatory apparatus (Figs 31-41) ..... 2
- Anterior tibia without tympanum. Males without wings (Fig. 43) ..... 8
- 2 Frontal rostrum about as wide as scapus (varying from slightly wider to slightly narrower; Figs 13-17) ..... 3
- Frontal rostrum two or three times wider than scapus (Figs 45, 65-66, 71-72) ..... 4
- 3 Pronotum ♂ moderately produced backwards, usually covering no more than base of mirror (Figs 31-37). If tegmen is almost completely covered (Fig. 38), then male phallic complex with lateral valves sclerotised, almost forming a tube near apex (Figs 175-177) ..... *Ornebius* Guérin-Ménéville, 1844
- Pronotum ♂ strongly produced backwards, leaving only the apex of tegmen free (Figs 46-47). Male phallic complex (of species studied) with lateral valves not or only very faintly sclerotised, not forming a tube (Figs 224-230) ..... *Ectatoderus* Guérin-Ménéville, 1847



- 4 Pronotum ♂ prolonged; tegmen completely concealed under pronotum or only apex free ..... 5
- Pronotum ♂ not prolonged; tegmen free from base (Figs 41, 45). Hind tibia not shortened, more than 2.5 times longer than hind metatarsus ..... *Gotvendia* Bolívar, 1927
- 5 Hind tibia shortened, 1.8x to 2.6x longer than hind metatarsus (Figs 82-84). Metatarsus with minute denticles ..... 6
- Hind metatarsus shorter than half the length of hind tibia. Metatarsus with denticles ..... *Derectaotus* Chopard, 1936<sup>1</sup>
- 6 General colour often brown; very small crickets (postfemur 2.3-4.3 mm, pronotum male 2.3-2.9, female 1.2-2.0 mm<sup>2</sup>). Hind tibia normal (Figs 82-83). Maxillary palps either short with apical segment greatly widened, or long with apical segment elongate and hardly widened ..... 7
- General colour black; small to medium sized crickets (postfemur 3.8-5.8 mm, pronotum male 2.3-3.8, female 2.0-2.9 mm). Hind tibia laterally compressed and widened (Fig. 84). Maxillary palps with apical segment distinctly widened but not shortened (Figs 332-340) ..... *Terraplistes* gen. n.
- 7 Maxillary palps short with apical segment greatly widened (Figs 231, 261). Male paraprocts with only a minute process or without any (Figs 233, 259). Male phallus usually with minute sclerites (Figs 263-285). Ovipositor apical valves with short hairs along margins and additionally with long bristles (Figs 286-292) ..... *Micronebius* Chopard, 1969
- Maxillary palps long with apical segment elongate and little widened (Figs 301, 318). Male paraprocts with a distinct or a very small process (Figs 302, 306, 309, 314). Male phallus with sclerotisation indistinct or missing (Figs 323-330). Ovipositor apical valves with few or numerous short hairs or few strong hairs of medium length, rarely with mixed longer and shorter hairs (Figs 293-299) ..... *Cycloptiloides* Sjöstedt, 1909
- 8 Frontal rostrum more than twice as wide as scapus ..... *Pachyornebius* Chopard, 1969
- Frontal rostrum one and half times wider than scapus or about as wide as scapus ..... 9
- 9 Frontal rostrum about as wide as scapus, not strongly projecting in front of antennae. Maxillary palps with last three segments elongate; last segment more than twice as long as greatest width (Figs 207-208). General shape of body as *Ornebius* except for missing wings and tympana (Figs 42-44). Ovipositor apical valves smooth (Figs 193-194) ..... *Apterornebius* gen. n.

<sup>1</sup> Characters taken from Chopard (1969). The genus *Derectaotus* as used in Chopard (1969) is probably a mixture of unrelated species. Its definition overlaps with *Ectatoderus* and *Micronebius*. A redefinition and a revision of the genus are necessary.

<sup>2</sup> If hind femur up to 5.5 mm and pronotum female 2.8 mm than apical valves of ovipositor lobiform (Fig. 299).

Frontal rostrum about one and half times wider than scapus, strongly projecting in front of antennae, distinctly furrowed. Maxillary palps with last three segments short; last segment less than twice as long as greatest width. Slender species. Ovipositor apical valves with ventral margin of dorsal valve serrulate.

..... *Arachnocephalus* Costa, 1855<sup>3</sup>

***Ornebius* Guérin-Méneville, 1844**

*Ornebius* Guérin-Méneville, 1844: 331; Otte *et al.*, 2005.

*Type species: Ornebius xanthopterus* Guérin-Méneville, 1844, by original designation (sensu OSF).

*Diagnosis for SE Asian species.* Maxillary palps moderately long; apical segment widened (Figs 85-98). Pronotum ♂ prolonged to a variable degree, usually covering stridulatory vein or base of mirror, in few species more than half of mirror; pronotum ♀ short (Figs 1-29). Wings reduced to stridulatory apparatus in male; female apterous. Anterior tibia with internal tympanum. Hind tibia (2.4-) 2.9-3.8x longer than metatarsus. Tenth abdominal tergite and epiproct more or less fused in both sexes to form a supra-anal plate, but borderline often still clearly visible; tenth tergite at apico-lateral angles with an obtuse projection (Figs 99-108, 123-138). Male paraprocts with distinct projections of variable shape (Figs 109-122a). Male phallic complex with epiphallus and ventral lobes entirely membranous; lateral valves sclerotised to a variable degree; internal sclerites always distinctly sclerotised (Figs 139-184). Ovipositor female with apical valves smooth or with minute dentation at ventral margin, occasionally smaller denticles also at dorsal margin (Figs 185-195).

*Discussion.* 102 extant species of which 94 are currently regarded valid were so far assigned to *Ornebius*, distributed over South and Central America, Africa, South and East Asia, Australia, Indian and Pacific Ocean Islands (Otte *et al.*, 2005). Of those were 33 species from the Indo-Malaysian region including Andaman Islands and Seychelles. The species from Thailand, Malaysia, Brunei, and Indonesia east to Sulawesi are included in the following key (formerly 15 described species). Not all species are known in both sexes.

**KEY TO SPECIES OF *ORNEBIUS* FROM THAILAND, MALAYSIA, SINGAPORE, BRUNEI, AND INDONESIA EAST TO SULAWESI**

Species not included in key:

*Ornebius fasciatus* (Brunner von Wattenwyl, 1893) from Myanmar (Carin Cheba) cannot be included in the key as the superficial description agrees with several species. As no information on maxillary palps, supra-anal plate, cerci, or phallic complex are known, it is not clear at which point to include it in the key.

*Ornebius komodensis* Bei-Bienko, 1966 from Komodo Island cannot be included in the key from the description alone.

<sup>3</sup> Although there are a few records of *Arachnocephalus* from South-East Asia, it is doubtful whether those species are really congeneric with the type species, *Arachnocephalus vestitus* Costa, 1855 known from South Europe. Characters in the above key are based on the type species *A. vestitus*.

## MALES

(Males of *O. albipalpus*, *O. angustus*, *O. imitatus*, *O. nigripes*, and *O. serratus* unknown)

- 1 Head black with a large, transverse, yellow swelling on vertex (Fig. 16).  
Northeast Thailand (Loei) . . . . . *O. tuberculatus* sp. n.
- Head without transverse swelling on vertex . . . . . 2
- 2 Maxillary palps very short with apical segment strongly widened (Fig. 98). Supra-anal plate very short, simple, apex obtuse-angular (Fig. 108).  
North Thailand (Lampang) . . . . . *O. brevipalpus* sp. n.
- Maxillary palps of medium length with apical segment widened; sometimes shortened but not as extreme (Figs 85-97). Supra-anal plate longer . . . . 3
- 3 Supra-anal plate with one or two spots of strong short hairs or bristles, standing together as in a brush (Figs 101-103, 106-107) . . . . . 4
- Supra-anal plate usually setose but without spots where the hairs are standing together as in a brush . . . . . 7
- 4 Supra-anal plate with one 'brush of hairs' (Fig. 106). Paraproct process very long, widened in middle, narrow styliiform in apical area (Fig. 117). Tegmen without dark band (Fig. 39). West Java (Palabuan Ratu) . . . . . *O. samudra* sp. n.
- Supra-anal plate with two 'brushes of hairs' (Figs 101-103, 107). Paraproct process not so long, of different shape. Tegmen with a dark band along apex (Figs 31-32, 35) . . . . . 5
- 5 Subgenital plate bowl-shaped with strongly upcurved lateral and apical margins. Pronotum little or moderately widening posteriorly (Figs 13, 18). Tegmen yellow with a broad black band at apex (Figs 31, 35). Paraproct process upcurved (Figs 109, 111). Phallic complex as in Figs 165-167, 170-171 . . . . . 6
- Subgenital plate with lateral and apical margins moderately upcurved. Pronotum strongly widened posteriorly (Fig. 27). Tegmen brownish transparent with medium brown apical margin (Fig. 32). Paraproct process not so strongly upcurved, straight (Fig. 114). Phallus as in Figs 160-161. West Java (Cibodas) . . . . . *O. cibodas* sp. n.
- 6 Frons black. Abdomen anterior tergites covered with golden scales, posterior tergites black (Fig. 13). Paraproct process as in Fig. 111. Phallic complex as in Figs 170-171. North Thailand (Chiang Mai) . . . *O. aureus* sp. n.
- Frons of general colour. Abdomen black. Paraproct process as in Fig. 109. Phallic complex as in Figs 165-167. North Thailand (Tak) . . . . . *O. peniculatus* sp. n.
- 7 Face and frontal rostrum of same colour as remaining head . . . . . 8
- Face and frontal rostrum black . . . . . 22
- 8 Mentawai Islands . . . . . 20
- Other distribution . . . . . 9
- 9 Paraproct process as long as paraproct height or shorter (Figs 112, 119) . . . . 10
- Paraproct process markedly longer than paraproct height (Figs 115-116, 118, 120-122) . . . . . 12



- 10 Pronotum strongly narrowing in front (Fig. 10). Paraproct process short and wide, compressed, strongly setose (Fig. 119). Tegmen with a narrow dark band at apex, a dark band at baso-lateral angle, and with or without additional dark spots in middle (Fig. 10). Sabah (Kinabalu area) ..... *O. marginatus* Ingrisch, 1998
- Pronotum moderately or little narrowing in front. Paraproct process rounded ..... 11
- 11 Tegmen dark brown with black apical margin (Fig. 40). Paraproct process short, cylindrical, with few hairs (Fig. 112). Phallic complex with medial valves forming a tube; ejaculatory duct with apex truncate (Figs 147-150). Brunei ..... *O. pullus* sp. n.
- Tegmen white, spotted with brown at apex and towards base. Paraproct process erected, rounded. Sarawak (Mt. Madang) ..... *O. angustifrons* (Chopard, 1930)
- 12 Maxillary palps with apical three segments elongate; fifth segment little widened (Figs 93-94). Phallic complex with external sclerites forming a dorsally and ventrally open tube near apex (Figs 172-177). Sulawesi ..... 13
- Maxillary palps with apical three segments shorter; fifth segment distinctly widened (Fig. 90). Ectophallus valves of different shape ..... 14
- 13 Pronotum longer, covering more than half of mirror (Fig. 22). Tegmen with a broad dark band at apex (Fig. 38). Paraproct process as in Fig. 116. Phallic complex as in Fig. 175-177. Sulawesi Utara ..... *O. consternus* sp. n.
- Pronotum shorter, covering only base of mirror (Fig. 24). Tegmen uniformly yellowish transparent (Fig. 37). Paraproct process as in Fig. 115. Phallic complex as in Figs 172-174. Sulawesi Utara ..... *O. dumoga* sp. n.
- 14 Tegmen uniformly yellow, orange, or dark brown (Figs 6, 8) ..... 15
- Tegmen yellow, orange or brown with a black (or dark brown) band at apex (Figs 3, 34) ..... 17
- 15 Tegmen yellow or light red. Pronotum reddish brown ..... 16
- Tegmen dark brown (Fig. 8). Pronotum dark brown with white margin. Paraproct process as in Fig. 120. Phallic complex as in Figs 155-159. Sabah (Kinabalu area) ..... *O. vadus* Ingrisch, 1998
- 16 Tegmen orange to light red. Paraproct process shorter and broad (Fig. 122), apex obtuse. Phallic complex as in Figs 151-154. Sabah (Kinabalu area) ..... *O. rubidus* Ingrisch, 1998
- Tegmen yellow. Paraproct process long and narrow, apex acute (Fig. 122a). South Thailand (Koh Samui) ..... *O. rufonigrus* Ingrisch, 1987
- 17 Tegmen amber coloured, covered by the pronotum to base of mirror; apical margin feebly darkened. Pronotum feebly widening posteriorly, with posterior margin feebly convex. Malaya (Pahang, Fraser's Hill) ..... *O. pendleburyi* Chopard, 1969
- Tegmen of different colour. Pronotum distinctly widening posteriorly (Figs 1, 3) ..... 18
- 18 Tegmen nearly wholly dark; apical margin little thickened, nearly black, lateral field black. Sarawak (Mt. Poi) ..... *O. obscuripennis* (Chopard, 1930)

- Tegmen yellow or light orange with black apical margin . . . . . 19
- 19 Tegmen with broad black apical margin (Fig. 3). Paraproct process as in Fig. 121. Phallic complex as in Figs 139-140. Sabah (Kinabalu area) . . . . . *O. flori* Ingrisch, 1998
- Tegmen with narrow black apical margin (Fig. 34). Paraproct process as in Fig. 118. Phallic complex as in Figs 141-146. Sabah (Crocker Range). . . . . *O. citrus* sp. n.
- 20 Three first abdominal tergites covered with yellow scales, the following ones with grey scales; inferior side of the abdomen silver grey. Tegmen smoky with posterior margin blackish; lateral field blackish with extreme margin white. Maxillary palps black; antennae yellow. Sipora Island, West Sumatra . . . . . *O. fuscipennis* (Chopard, 1929)
- Other combination of characters . . . . . 21
- 21 Apical part of supra-anal plate ('supra-anal valve' in Chopard, 1929) much wider than long with a rather short erected yellow process. Tegmen very dark smoky brown with posterior margin nearly black; lateral lobes smoky. Maxillary palps yellow with a few brown spots. Sipora Island . . . . . *O. minusculus* (Chopard, 1929)
- Pronotum elongate, scarcely widened backwards; lateral lobes narrowly lined with yellow. Cheeks yellow, with a very distinct limit behind the eyes. Elytra extending little beyond pronotum, with posterior margin strongly darkened; mirror concealed up to the anterior third; lateral field yellow with a brown band. Sipora Island . . . . . *O. karnyi* Chopard, 1929
- 22 Tegmen covered almost as far as middle of mirror. Malaysia (Perak) . . . . . *O. nigrifrons* Chopard, 1969
- Tegmen uncovered from base of mirror. Malaysia (Kedah Peak) . . . . . *O. nigrirostris* Chopard, 1969

## FEMALES

(Females of *O. angustifrons*, *O. brevipalpus*, *O. cibodas*, *O. pendleburyi*, *O. peniculatus*, and *O. pullus* unknown)

- 1 Ovipositor with ventral margin of apical valves dentate (Figs 185-187, 191) . . . . . 2
- Ovipositor with ventral margin of apical valves smooth (Figs 188-190, 192-193) . . . . . 5
- 2 Supra-anal plate with apical part transverse; apex slightly convex (Figs 127-128) . . . . . 3
- Supra-anal plate with apical part tongue shaped; apex rounded (Figs 126, 130) . . . . . 4
- 3 Ovipositor 6.3 mm; hind femur 6.3 mm. Face and lateral area of pronotum black. Supra-anal plate furrowed at base; apical part yellow (Fig. 127; but with a black band on underside). North Thailand (Chiang Mai). . . . . *O. aureus* sp. n.
- Ovipositor 4.9 mm; hind femur 5.5 mm. Face and lateral area of pronotum of same colour as remaining parts of head and pronotum. Supra-anal

- plate not furrowed at base; apical part yellow with a broad black band at apex (Fig. 128). North Thailand (Chiang Mai) . . . . . *O. serratus* sp. n.
- 4 Supra-anal plate very narrow; base and margin of apical area black (Fig. 126). Ovipositor apical valves with dorsal margin finely serrulate (Fig. 186). North Thailand (Chiang Mai) . . . . . *O. angustus* sp. n.
- Supra-anal plate little wider; basal dark spot interrupted, apical area almost completely dark brown (Fig. 130). Ovipositor apical valves with dorsal margin smooth (Fig. 191). Northeast Thailand (Loei) . . . . . *O. tuberculatus* sp. n.
- 5 Maxillary palps with basal three segments light, apical two segments black. Tibiae black. Krakatau Island . . . . . *O. nigripes* Chopard, 1927
- Maxillary palps of different colour pattern; if similar also the third segment of the maxillary palps is brown or black and the tibiae are yellow . . . . 6
- 6 Mentawai Islands . . . . . 17
- Other distribution . . . . . 7
- 7 Frons black; head otherwise yellow, white or reddish brown . . . . . 18
- Frons of same colour as other parts of head (yellow, reddish brown or dark brown) . . . . . 8
- 8 Maxillary palps elongate; apical segment little widened (Figs 93-94). Sulawesi . . . . . 9
- Maxillary palps with apical segment shorter and distinctly widened (Figs 89-92, 95-97). Other areas . . . . . 10
- 9 Supra-anal plate much narrower than ninth abdominal tergite (Fig. 132) . . . . . *O. dumoga* sp. n.
- Supra-anal plate little narrower than ninth abdominal tergite (Fig. 131). . . . . *O. consternus* sp. n.
- 10 Ovipositor 3.0-5.5 mm . . . . . 11
- Ovipositor 6.1-9.0 mm . . . . . 13
- 11 Ovipositor slightly curved, 3.1-4.1 mm. Supra-anal plate with apical area transverse (Fig. 135). Sabah (Kinabalu area) . . . . *O. marginatus* Ingrisch, 1998
- Ovipositor straight, 4.2-5.1 mm . . . . . 12
- 12 Ovipositor 4.2 mm. Abdomen brown above, yellow beneath. Sarawak (Mt. Poi) . . . . . *O. obscuripennis* (Chopard, 1930)
- Ovipositor 4.4-5.1 mm. Abdomen with anterior segments reddish brown, posterior segments black, or almost fully black (Fig. 4). Supra-anal plate with apical area rounded (Fig. 137). Sabah (Kinabalu area) . . . . . *O. flori* Ingrisch, 1998
- 13 Supra-anal plate entirely black (only lateral appendages may be less dark); tenth abdominal tergite and epiproct fused. Head and pronotum reddish brown . . . . . 14
- Supra-anal plate brown with white ornaments; tenth abdominal tergite and epiproct with distinct borderline (Fig. 138). Head and pronotum dark to blackish brown (Fig. 9). Sabah (Kinabalu area) . . . . . *O. vadus* Ingrisch, 1998



- 14 Supra-anal plate in basal two thirds with a large matt area with angular apex, remaining apical area smooth (Fig. 123). West Java (Palabuan Ratu) . . . . . *O. samudra* sp. n.  
 - Supra-anal plate smooth throughout . . . . . 15
- 15 Supra-anal plate with apical area small, triangular or angularly rounded (Figs 125, 136). Ovipositor 6.1-7.5 mm . . . . . 16  
 - Supra-anal plate with apical area larger, broadly rounded (Fig. 134). Ovipositor 9 mm. South Thailand (Koh Samui) . . *O. rufonigrus* Ingrisch, 1987
- 16 Ovipositor 6.1-6.6 mm. Sabah (Crocker Range) . . . . . *O. citrus* sp. n.  
 - Ovipositor 6.5-7.5 mm. Sabah (Kinabalu area) . . . . . *O. rubidus* Ingrisch, 1998
- 17 Maxillary palps black. Sipora Island . . . . . *O. fuscipennis* (Chopard, 1929)  
 - Maxillary palps yellow. Sipora Island . . . . . *O. minusculus* (Chopard, 1929) [and *O. karnyi* Chopard, 1929 the female of which is only known in the immature state]
- 18 Maxillary palps pale yellow; apical segment rather short and wide, of equal length with fourth segment, shorter than third segment (Fig. 95). Supra-anal plate bent ventrad in a 90°-angle in about middle of length; black with white apex (Fig. 129). Ovipositor 6.5 mm. West Java (Palabuan Ratu) . . . . . *O. imitatus* sp. n.  
 - Maxillary palps and supra-anal plate different. Ovipositor shorter than 6 mm . . . . . 19
- 19 Maxillary palps with fourth segment shorter than third. Malaysia (Kedah Peak), female unknown . . . . . *O. nigrirostris* Chopard, 1969  
 - Other distribution . . . . . 20
- 20 Maxillary palps with fourth segment of equal length with third segment (Fig. 96). Pronotum little longer than wide, 2 mm long (Fig. 26); ovipositor 5.4 mm. Supra-anal plate as in Fig. 124. Singapore . . *O. albipalpus* sp. n.  
 - Pronotum about one quarter longer than wide, 3 mm long; ovipositor 4 mm. Malaysia (Perak, Larut Hills) . . . . . *O. nigrifrons* Chopard, 1969

***Ornebius albipalpus* sp. n.**

Figs 26, 96, 124, 190, 203

*Holotype* (♀): Singapore: Island Country Club, between Lower Peirce Reservoir and Windsor Park Estate, 60 m, relics of primary forest within secondary forest, 12.xi.1988, leg. Charles Lienhard (MHNG).

*Measurements* (1 ♀). Body 9.3; pronotum 1.9; pronotum width 1.8; hind femur 5.4; hind tibia 3.8; hind metatarsus 1.2; ovipositor 5.4 mm. – Ratio pronotum length to width 1.07; ratio hind tibia to metatarsus 3.15.

*Description*. Frontal rostrum as wide as scapus, without medial furrow. Maxillary palps with apical segment widened; three apical segments of subequal length (Fig. 96). Pronotum ♀ almost as wide as long; scarcely narrowing in front; anterior and posterior margins substraight (Fig. 26). Hind femur 1.4x longer than hind tibia; hind tibia 3.2x longer than metatarsus.

♂ unknown.

♀ abdomen. Ninth abdominal tergite with apex concave. Supra-anal plate with apex subtruncate; fused with epiproct (Fig. 124). Epiproct rounded. Subgenital plate

triangular or semi-circular in general outline; little notched at apex (Fig. 203). Ovipositor long; apical valves with margins smooth; ventral margin of dorsal valves with 4 bristles (Fig. 190).

**Colouration.** Reddish brown. Head with frontal rostrum and labrum black; antenna with scapus and base of flagellum blackish brown, afterwards yellow with indistinct spaced annulation; maxillary palps light yellow, external area of fourth segment darkened. Pronotum reddish brown. Legs yellow, spotted with brown. Abdomen ♀ with first segments brown, afterwards black with white apical margins; underside paler. Supra-anal plate almost white; brown at base and very apex. Subgenital plate medium brown. Cerci yellowish brown. Ovipositor medium brown, apical valves little darkened.

**Discussion.** The new species is characterised by the black frons of the otherwise light coloured head. This character it shares with *O. nigrifrons* Chopard, 1969 from Perak and *O. nigrirostris* Chopard, 1969 from Kedah, North-Malaysia. From *O. nigrifrons* it differs by the longer ovipositor and a shorter and comparatively wider pronotum; from *O. nigrirostris* which is only known from the male type it differs by shape of the maxillary palps with the three apical segments being of equal length not the fourth shorter than the third. Otherwise only colouration can be taken as non-sexual characters from the description given in Chopard (1969). With regard to colouration, *O. albipalpus* differs from *O. nigrirostris* by the cheeks and the lateral lobes of the pronotum being of the same colour as the vertex and the disc of pronotum, i.e. reddish to yellowish brown not white, the antennae have the base of the flagellum black not only the two basal segments, the maxillary palps are pale yellow, almost white instead of yellowish brown. Differences to other species are outlined in the key.

**Etymology.** Named for the light palps.

***Ornebius angustus* sp. n.**

Figs 15, 86, 126, 186, 200

**Holotype** (♀): Thailand: Chiang Mai, Doi Suthep-Pui, 1150-1350 m, 18° 48' N, 98° 55' E, 28.v.1997, leg. S. Ingrisch (ZFMK).

**Measurements** (1 ♀). Body 9.9; pronotum 2.5; hind femur 6.4; hind tibia 4.7; ovipositor 6.9 mm.

**Description.** Frontal rostrum slightly wider than scapus, faintly furrowed in midline. Maxillary palps with apical segment distinctly widened; fourth segment little shorter than third and fifth segments (Fig. 86). Pronotum ♀ little longer than wide, scarcely narrowing in front; anterior and posterior margins substraight (Fig. 15). Anterior tibia with internal tympanum. Hind femur 1.3-1.4x longer than hind tibia; hind tibia 3.2x longer than metatarsus.

♂ unknown.

♀ abdomen. Supra-anal plate divided; basal part black with a weak suture in midline; apical part narrow tongue shaped, furrowed in middle (Fig. 126). Subgenital plate triangular, apex notched (Fig. 200). Ovipositor long; apical valves dorsal margin with minute denticles, ventral margin with 6-8 small teeth; ventral margin of dorsal valves with 4-6 bristles (Fig. 186).

**Colouration.** Head nearly black with silver scales; genae reddish brown; antenna with scapus black, pedicellus brown, flagellum yellow; maxillary palps yellow.

Pronotum reddish brown; lateral area black with yellow margin. Legs yellow with faint marmoration. Abdomen ♀ black; supra-anal plate yellow with base and apex black. Cerci yellow. Ovipositor reddish brown.

*Discussion.* The new species is close to *O. aureus* and *O. serratus* which live in the same area. It differs distinctly by the female supra-anal plate with the narrow elongate epiproct (Fig. 126). In contrast to *O. aureus* but not to *O. serratus*, the ovipositor apical valves show a fine serrulation on both margins not only on the ventral margin. For the recognition of the corresponding male, colouration might be useful as it also differs from both related species. The head is black with reddish brown gnaea and yellowish brown palpi, the pronotum reddish brown with black lateral lobes, the abdomen without golden scales, and the apical segments of the tarsi are not darkened. The differences to other species are outlined in the key.

*Etymology.* The name refers to the narrow supra-anal plate; from Latin angustus = narrow.

***Ornebius aureus* sp. n.** Figs 13-14, 31, 85, 103, 111, 127, 170-171, 185, 198, 357, 365, 372

*Holotype* (♂): Thailand: Chiang Mai, Doi Suthep-Pui, 1100-1200 m, 18° 48' N, 98° 55' E, 6.iv.1993, leg. S. Ingrisch (ZFMK).

*Paratypes*: 1 ♂, 1 ♀, same locality as holotype, 13.iv.1995 (♂ CI, ♀ ZFMK).

*Measurements* (2 ♂, 1 ♀). Body ♂ 9.2-12.4, 10.8±2.3, ♀ 8.7; pronotum ♂ 3.3-3.4, ♀ 2.5; pronotum width ♂ 2.6-2.7, ♀ 2.3; tegmen ♂ 3.3-3.5; tegmen width ♂ 3.0; hind femur ♂ 5.7-5.9, ♀ 6.3; hind tibia ♂ 4.1, ♀ 4.7; hind metatarsus ♂ 1.2, ♀ 1.4; ovipositor ♀ 6.3 mm. – Ratio pronotum length to width ♂ 1.21-1.32, ♀ 1.06; ratio hind tibia to metatarsus ♂ 3.42, ♀ 3.4; ratio tegmen length to width ♂ 1.17.

*Description.* Frontal rostrum slightly wider than scapus, faintly furrowed in midline. Maxillary palps with apical segment distinctly widened; fourth segment little shorter than third and fifth segments (Fig. 85). Pronotum ♂ with anterior dorsal margin subtruncate; lateral margins very little widening posteriorly; posterior margin convex, covering tegmen to base of mirror (Fig. 13). Pronotum ♀ little longer than wide, scarcely narrowing in front; anterior and posterior margins substraight (Fig. 14). ♂ tegmen slightly wider than posterior area of pronotum; posterior margin convex (Fig. 31). Hind femur 1.3-1.4x longer than hind tibia; hind tibia 3.2-3.4x longer than metatarsus.

♂ abdomen. Supra-anal plate with tenth abdominal tergite clearly separated from epiproct; tenth tergite rhombic, faintly depressed in middle and on both sides; apex broadly convex, with a bunch of long hairs at both sides of middle; apico-lateral area with a compressed projection; epiproct bulging, apex rounded (Fig. 103). Paraproct process compressed in basal half and here with an external furrow; external side and apex black, internal side white; apical area styliform, acute (Fig. 111). Subgenital plate with almost parallel sides; apical margin rounded, upcurved and a little excised in middle. Epiphallus membranous; external sclerites elongate, divided in a basal and an apical part, forming an angle at transient zone; internal sclerites slightly curved, more strongly so at base (Figs 170-171).

♀ abdomen. Ninth abdominal tergite with apex feebly concave. Supra-anal plate divided, basal part with small lateral projections; apical part broad and apex trun-



cate (Fig. 127). Paraprocts simple. Subgenital plate triangular with margins upcurved; apex notched (Fig. 198). Ovipositor long; ventral margin with 6-8 small teeth; ventral margin of dorsal valves with 4-6 bristles (Fig. 185).

Colouration. Colourful. Head with vertex dark reddish brown to dark brown; genae yellowish brown with black spots; frons black; antenna with scapus black, pedicellus brown, flagellum yellow; maxillary palps yellow. Pronotum reddish brown with silver or golden scales; lateral area black with yellow margin. Tegmen bright yellow, at apex with a broad black band; lateral area with a broad black band above, white below. Legs yellow with black and brown marmoration; apical two segments of tarsus black. Abdomen ♂ black; on dorsal side anterior segments with golden scales, apical segments with silver scales; on ventral side with silver scales, subgenital plate black. Cerci yellow. Abdomen ♀ as in ♂; supra-anal plate yellow, basal part black. Subgenital plate brown with silver scales. Cerci yellow. Ovipositor yellowish to reddish brown.

*Discussion.* The new species can easily be recognised by the characteristic shape of the male and female supra-anal plate. Only three other species have the male supra-anal plate provided with two brushes of short hairs at the end of the basal part. From *O. cibodas* it differs by the shape of the pronotum, the paraproct process and the phallic complex; from *O. tuberculatus* it differs by the absence of a transverse swelling on vertex, different colour pattern, the maxillary palps being yellow instead of dark brown, larger paraproct processes, and minute differences in the phallic complex; from *O. peniculatus* it differs by the golden scales at the anterior segments of abdomen and the phallic complex. The female is characterised by the small teeth at the ventral margins of the ovipositor apical valves. From the other species with similar armature (*O. angustus*, *O. serratus*, *O. tuberculatus*) it differs by shape and colour pattern of the supra-anal plate. The differences to other species are outlined in the key.

As in the Mt. Kinabalu area of Sabah (Ingrisch, 1998), also in the Doi Suthep-Pui area of North Thailand several *Ornebius* species have been found, i.e. *O. aureus*, *O. angustus*, and *O. serratus*. The *Ornebius* species from Sabah were predominantly collected from the canopy (Floren *et al.*, 2001) while those from Doi Suthep by ground near sampling. Only a few specimens were found by the latter method. All three specimens of *O. aureus* were collected as nymphs in rolled leaves, and bred to adults. A male and a female were collected together at the same place and date which was taken as indication that both belong together, so more as both agree in general characters and colouration. Both other species from the area were collected as single females. They differ however distinctly in the shape of the supra-anal plate that they cannot be regarded as belonging to the same species (Figs 126-128). This is especially true for *O. angustus* which was found in the same forest as *O. aureus* but about 50-100 m higher up on the mountain.

*Etymology.* The name refers to the shining golden scales covering the anterior abdominal segments; from Latin aureus = made of gold.

*Stridulation* (Figs 357, 365, 372). The calling song is complex. It consists of an irregular sequence of chirp groups. Both, the number of the chirps per group and the chirp group interval vary. Each chirp consists of three pulses. The first two pulses following immediately after each other while the third follows after a short pause. At

24°C, chirp duration was 145-164 ms (mean  $155 \pm 6.1$ ,  $n=25$ ), the pause between the second and third pulse of a chirp 63-75 ms (mean  $71 \pm 3.0$ ), and the pause between two succeeding chirps 82-122 ms (mean  $103 \pm 10.4$ ). Frequency maximum was about 6.1-6.4 kHz.

***Ornebius bogor* sp. n.**

Figs 12, 92, 133, 188, 204

*Holotype* (♀): Indonesia: West Java, Bogor, Kebun Raya, 250 m, 6° 35' S, 106° 47' E, 9.ii.1995, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♀). Body: 6.6; pronotum: 1.9; pronotum width: 1.6; hind femur: 4.4; hind tibia: 3.0; hind metatarsus: 1.0; ovipositor: 3.3 mm. – Ratio pronotum length to width: 1.2; ratio hind tibia to metatarsus: 3.0.

*Description.* Frontal rostrum slightly wider than scapus, without medial furrow. Maxillary palps with apical segment strongly widened; all three apical segments of subequal, medium length (Fig. 92). Pronotum ♀ longer than wide; scarcely narrowing in front; anterior and posterior margins feebly convex; lateral lobes nearly angularly inserted to disc (Fig. 12). Anterior tibia with internal tympanum. Hind femur 1.4-1.5x longer than hind tibia; hind tibia 3.0x longer than metatarsus.

♂ unknown.

♀ abdomen. Supra-anal plate triangular with apex rounded, with a shallow groove in middle (Fig. 133). Paraprocts simple. Subgenital plate triangular with margins upcurved; apex broadly rounded (Fig. 204). Ovipositor short; apical valves with margins smooth, dorsal valves with a long hair at base of dorsal margin; ventral margin of dorsal valves with 6 bristles (Fig. 188).

*Colouration.* Brown. Head with vertex and upper part of genae dark brown with darker spots; frons reddish brown, clypeus white; mouthparts and lower area of genae light brown; antenna yellowish brown with spaced dark annulation; maxillary palps yellowish brown. Pronotum with disc dark brown, along margins black; lateral lobes dirty white. Legs on external side mostly dark brown with irregular light areas; internal side with large areas almost white; tibiae maculated. Abdomen ♀ dark brown above, light brown below, on ventral side with alternating bands of white and brown scales. Subgenital plate light brown. Cerci speckled with light and dark brown scales. Ovipositor yellowish brown, apical valves brown.

*Discussion.* The new species differs from other *Ornebius* species by its narrow, slender appearance, and the uniform greyish brown colour. The ♀ supra-anal plate has the apex broad angularly rounded but is without striking colours or peculiar shape. This also differs from the situation in other *Ornebius* species. The diagnostic characters against other species are outlined in the key.

*Etymology.* Named after the type locality; noun in apposition.

***Ornebius brevipalpus* sp. n.**

Figs 29, 33, 98, 108, 113, 181-184

*Holotype* (♂): Thailand: Lampang, Doi Khun Tan, 900-950 m, 18° 29' N, 99° 18' E, 16.-17.ix.1993, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♂). Body 6.7; pronotum 2.5; pronotum width 1.7; tegmen 2.8; tegmen width 1.8; hind femur 4.1; hind tibia 2.8; hind metatarsus 0.95 mm. – Ratio

pronotum length to width 1.48; ratio hind tibia to metatarsus 2.9; ratio tegmen length to width 1.51.

*Description.* Frontal rostrum slightly wider than scapus, with a faint medial suture. Maxillary palps with apical segment strongly widened; the third segment little longer than fourth and fifth segments; all three apical segments together 0.93 mm (Fig. 98). Pronotum ♂ with anterior margin truncate; lateral margins slightly widening posteriorly; posterior margin convex, covering base of mirror (Fig. 29). ♂ tegmen slightly wider than posterior area of pronotum; posterior margin convex (Fig. 33). Hind femur 1.5x longer than hind tibia; hind tibia 2.9x longer than metatarsus.

♂ abdomen. Supra-anal plate completely fused with epiproct; very short, flat, triangular, apex rounded in middle (Fig. 108). Paraproct process compressed on internal, rounded on external side, yellowish brown, darkened towards base; paraproct with a second, dorsal projection forming a small, black hook (Fig. 113). Subgenital plate triangular with margins upcurved; apex notched. Phallic complex broken in specimen at hand; with small, little distinct sclerotisation (Figs 181-184).

♀ unknown.

Colouration. Reddish brown and black. Vertex reddish brown with a black spot in middle; frons, antenna and maxillary palps yellowish brown. Pronotum with disc reddish brown, lateral lobes yellow. Tegmen pale yellow, at apex with hardly visible infumation; lateral area same as disc. Legs pale yellow. Abdomen ♂ black on both sides. Epiproct and subgenital plate black. Cerci pale yellow.

*Discussion.* The new species is unique for its short maxillary palps with the three apical segments together shorter than 1 mm, in other species they are distinctly longer than 1 mm. Also the male paraprocts having two processes and the phallic complex differs from the situation in other *Ornebius* species from SE Asia. It is not impossible that it represents an undescribed genus. To decide on it would require a more comprehensive study of the genus including species from other faunal regions.

*Etymology.* The name refers to the short maxillary palps.

***Ornebius cibodas* sp. n.**

Figs 27, 32, 89, 102, 114, 160-161

*Holotype* (♂): Indonesia: West Java, Cibodas, 1300-1400 m, 6° 43' S, 107° 0' E, 25.xi.1987, leg. Charles Lienhard (MHNG).

*Measurements* (1 ♂). Body ♂ 10.2; pronotum ♂ 3.2; pronotum width ♂ 2.7; tegmen ♂ 3.8; tegmen width ♂ 3.2; hind femur ♂ 5.2; hind tibia ♂ 3.8; hind metatarsus ♂ 1.2 mm. – Ratio pronotum length to width ♂ 1.21; ratio hind tibia to metatarsus ♂ 3.15; ratio tegmen length to width ♂ 1.2.

*Description.* Frontal rostrum slightly wider than scapus, without medial furrow. Maxillary palps with apical segment widened; three apical segments of subequal length (Fig. 89). Pronotum ♂ with lateral margins strongly widening posteriorly; posterior margin convex, covering stridulatory vein of tegmen (Fig. 27). ♂ tegmen broader than pronotum; posterior margin convex; mirror trapezoidal, slightly wider than long (Fig. 32). Hind femur 1.4x longer than hind tibia; hind tibia 3.2x longer than metatarsus.

♂ abdomen. Supra-anal plate [probably deformed on left side] divided into tenth abdominal tergite and epiproct; tenth tergite with two tubercles at apical margin each carrying a brush of short hairs; epiproct rounded (Fig. 102). Paraproct process



long and narrow, faintly curved, light brown, with separate hairs (Fig. 114). Subgenital plate apical margin rounded and upcurved, notched in middle. Epiphallus membranous, covering central lobe completely. Lateral valves elongate, forming together a stiff tube, terminating in rounded lobes; largely membranous, sclerotisation restricted to oblique plates near apex; internal sclerites elongate; spermatophore sac with sclerotised margin (Figs 160-161).

♀ unknown.

**Colouration.** Medium brown, underside light brown to almost white. Head with frons medium brown; genae with pale ventral margin; antenna with scapus and pedicellus brown, flagellum yellow with indistinct spaced annulation; maxillary palps brown. Pronotum apical margin with white scales. Tegmen medium brown with slightly darker flecks, at apex with a diffuse blackish brown band; lateral area medium brown. Legs light with dark marmoration; genicular area of femora, dorsal area of hind femur, and wide rings on tibiae with dark scales. Abdomen greyish brown above, almost white below. Subgenital plate black, baso-central area light. Cerci yellowish brown.

**Discussion.** Although the male supra-anal plate of the specimen at hand is probably malformed, its proper shape can be imagined from the entire right half. *O. cibodas* belongs to the group of species which carry two brushes of short hairs on the male supra-anal plate. It differs from other species of this group (*O. aureus*, *O. tuberculatus*, *O. peniculatus*) by the pronotum strongly widening posteriorly, the paraproct process being straight, the phallus with the lateral valves forming a tube around the medial valve, and colouration.

**Etymology.** The name refers to the type locality; noun in apposition.

***Ornebius citrus* sp. n.**

Figs 1-2, 34, 90, 99, 118, 125, 141-146

**Holotype** (♂): East Malaysia: Sabah, Crocker Range, near village Bandukan-Keningau, 5° 26' N, 116° 8' E, canopy fogging, 18.ii.2001, leg. A. Floren (ZFMK).

**Paratypes:** East Malaysia: 10 ♂, 3 ♀, Sabah, Crocker Range, near villages Bandukan-Keningau, 5° 26' N, 116° 8' E, canopy fogging, 18.ii.2001, leg. A. Floren (7 ♂, 3 ♀ ZFMK, 3 ♂ CI); 17 ♂, 15 ♀, Crocker Range, near village Ulu Liawan, 5° 24' N, 116° 5' E, canopy fogging, 20.ii.2001, leg. A. Floren (12 ♂, 7 ♀ ZFMK, 4 ♂, 4 ♀ MHNG, 1 ♂, 4 ♀ CI).

**Measurements** (28 ♂, 18 ♀). Body ♂ 7.9-11.2,  $9.5 \pm 0.7$ , ♀ 7.8-10.0,  $8.7 \pm 0.7$ ; pronotum ♂ 2.2-3.2,  $3 \pm 0.2$ , ♀ 2.1-2.3,  $2.2 \pm 0.1$ ; pronotum width ♂ 2.1-2.8,  $2.4 \pm 0.1$ , ♀ 1.9-2.2,  $2.1 \pm 0.1$ ; tegmen ♂ 3.0-3.5,  $3.3 \pm 0.1$ ; tegmen width ♂ 3.0-3.3,  $3.2 \pm 0.1$ ; hind femur ♂ 5.2; ovipositor ♀ 6.1-6.6,  $6.3 \pm 0.2$  mm. – Ratio pronotum length to width ♂ 1.06-1.33,  $1.2 \pm 0.1$ , ♀ 1-1.16,  $1 \pm 0$ ; ratio tegmen length to width ♂ 0.96-1.15,  $1.05 \pm 0.04$ . [Hind legs missing with most specimens].

**Description.** Frontal rostrum as wide as scapus, faintly furrowed in midline. Maxillary palps with apical segment strongly widened; fourth and fifth segments of equal length, shorter than third segment (Fig. 90). Pronotum ♂ with lateral margins widening posteriorly; posterior margin convex, covering stridulatory vein of tegmen (Fig. 1). ♂ tegmen broader than pronotum; posterior margin convex (Fig. 34).

♂ abdomen. Supra-anal plate with a concave suture behind middle; setose along suture; apical margin rounded (Fig. 99). Paraproct process long, compressed, curved, black, ventro-apical area partly white, with single hairs (Fig. 118). Subgenital plate



apical margin rounded. Epiphallic lobe triangular, membranous, apex very faintly excised, covering base of central lobe (Figs 141-142). Lateral valves forming dorso-ventrally compressed, separate lobes; apices of valves obliquely truncate to slightly convex; medial valve curved at base forming a semi-circle, apex pointed (Figs 144-146). Ventral lobe forming two rounded globes (Fig. 143).

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate with strongly narrowing lateral margins; epiproct triangularly-rounded, elevated in middle (Fig. 125). Subgenital plate transverse, apex truncate. Ovipositor long; apical valves with margins smooth; ventral margin of dorsal valves with 3-6 bristles.

Colouration. Reddish brown. Antenna with scapus and pedicellus brown; base of flagellum black, afterwards brown to yellow with spaced annulation. Maxillary palps brown. Pronotum uniformly reddish brown. Tegmen yellowish transparent; tegmen base same as surface, at apex with a broad dark brown band; lateral area same as disc. Legs reddish brown; hind femur dark brown, marmorated. Abdomen ♂ with tergites black, sternites dark brown to black. Cerci base white, afterwards black, apex light. Abdomen ♀ with tergites usually black, sternites dark brown to black. Cerci with base and very apex white, infumate towards middle. Ovipositor brown.

*Discussion.* *O. citrus* is similar to *O. flori*. It differs superficially by a more intense yellow colour of the male tegmen and by the dark brown cerci. Diagnostic characters are in the male the ejaculatory duct having the apex elongate and acute, not truncate as in *O. flori*, and in the female the ovipositor being distinctly longer (6.1-6.6 against 4.6-5.1 mm). The male phallic complex resembles the situation in *O. rubidus* and *O. vadus*. It differs from both by the shape of the supra-anal plate in both sexes, in the male by the paraproct processes and the tegmen with a dark band at apex, in the female by the ovipositor length, and by size and colouration. Differences against other species are outlined in the key. *O. citrus* seems to replace *O. flori* and *O. rubidus* in the more south western parts of the Crocker Range. It was found near the villages Bandukan-Keningau, and Ulu Liawan but not in the Kinabalu area where both other species occur.

*Etymology.* Named after the intense yellow colour of the male tegmen.

***Ornebius consternus* sp. n.** Figs 22-23, 30, 38, 93, 105, 116, 131, 175-177, 197

*Holotype* (♂): Indonesia: Sulawesi, Sulawesi Utara, Dumoga-Bone National Park, 400 m, 19.vii.1985, leg. Nigel Stork (BMNH).

*Paratypes*: 1 ♂, same locality as holotype, 200 m, 5.ii.1985; 2 ♀, same locality 300 m, 8.ii.1985; same locality, 1 ♂, 1 ♀, same locality 400 m, 11.ii.1985; 1 ♀, same locality 300 m, 13.ii.1985; 4 ♂, same locality 200 m, 11.iii.1985; 1 ♀, same locality 200 m, 11.vii.1985; 1 ♂, same locality 200 m, 30.ix.1985; 2 ♂ same locality without date (BMNH).

*Measurements* (10 ♂, 5 ♀). Body ♂ 9.3-11.1, 10±0.6, ♀ 9.9-12.4, 11.3±1; pronotum ♂ 4.3-4.8, 4.6±0.1, ♀ 2.2-2.4, 2.3±0.1; pronotum width ♂ 2.7-3.0, 2.8±0.1, ♀ 2.1-2.2, 2.1±0; tegmen ♂ 3.3-3.7, 3.5±0.1; tegmen width ♂ 2.8-3.1, 3±0.1; hind femur ♂ 5.2-5.6, 5.4±0.1, ♀ 5.7-6.0, 5.8±0.1; hind tibia ♂ 3.8-4.4, 4.1±0.2, ♀ 4.3-4.6, 4.5±0.1; hind metatarsus ♂ 0.9-1.3, 1.1±0.1, ♀ 1.2-1.3, 1.2±0; ovipositor ♀ 6.3-6.6, 6.5±0.1 mm. — Ratio pronotum length to width ♂ 1.53-1.68; ♀ 1.03-1.15, 1.1±0; ratio hind tibia to metatarsus ♂ 3.3-4.36, 3.7±0.4, ♀ 3.57-3.73, 3.6±0.1; ratio tegmen length to width ♂ 1.08-1.23, 1.2±0.

*Description.* Frontal rostrum slightly wider than scapus, faintly furrowed in midline. Maxillary palps with apical segment widened and of about same length with third segment; fourth segment little shorter than third (Fig. 93). Pronotum ♂ with lateral margins slightly widening posteriorly; posterior margin convex, covering mirror but leaving apex of tegmen free (Fig. 22). Tegmen of about same width with posterior area of pronotum; posterior margin of tegmen convex (Fig. 38). Pronotum ♀ little longer than wide; lateral margins slightly convex; anterior and posterior margins substraight (Fig. 23). Hind femur 1.2-1.4x longer than hind tibia; hind tibia 3.3-4.3x longer than metatarsus (Fig. 30).

♂ abdomen. Supra-anal plate with tenth abdominal tergite distinctly divided from epiproct by a transverse suture; along suture with a bunch of long hairs at both sides of middle; apex rounded (Fig. 105). Paraproct process long and narrow, faintly compressed, dark brown, with very fine hairs (Fig. 116). Subgenital plate with apical margin rounded and upcurved. Central lobe of phallus with lateral valves elongate, in apical area curved ventrad and together almost forming a tube with dorsal and ventral areas open; external sclerites well developed; medial valve widened and curved at base; internal sclerites elongate (Figs 175-177). Ventral lobe forming two large lobes reaching apex of ectophallus.

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate with apical area globular, rounded (Fig. 131). Subgenital plate triangular or semi-circular in general outline; apex notched (Fig. 197). Ovipositor long; apical valves with margins smooth.

*Colouration.* Light to medium brown. Head with frons yellowish brown; antenna with scapus and pedicellus brown, flagellum light with spaced dark annulation; maxillary palps usually yellowish brown, apex little darkened. Pronotum at apical margin with white scales. Tegmen transparent, at apex with a broad dark brown band; lateral area dark brown, ventral margin white. Legs light with dark marmoration; hind femur with external area almost uniformly pale. Abdomen ♂ dark to light brown above, light below; apical margin of segments white. Subgenital plate dark brown, baso-central area light. Cerci yellow, darker towards apex. Abdomen ♀ as in ♂. Subgenital plate dark brown. Cerci yellowish brown. Ovipositor yellowish brown, base and apical valves reddish brown.

*Discussion.* *O. consternus* is closely related to *O. dumoga* as can be estimated from similarities of the male phallic complex, the male paraprocts, the maxillary palps, and the general morphology of the supra-anal plate in both sexes. It is thus described here under *Ornebius* although species with long male pronotum covering most of the tegmen were usually described under *Ectatoderus*. *O. consternus* differs from *O. dumoga* by the long male pronotum covering the tegmen except for the apex, the internal sclerites of the male phallus little sclerotised and not laterally expanded at base, a wider supra-anal plate especially in the female, and the ovipositor being a little longer.

*Etymology.* The name refers to the long pronotum covering most of the tegmina; from Latin consternere = to cover.

*Ornebius dumoga* sp. n.

Figs 24-25, 37, 94, 104, 115, 132, 172-174, 192, 196

*Holotype* (♂): Indonesia: Sulawesi, Sulawesi Utara, Dumoga-Bone National Park, 200 m, 8.ii.1985, leg. Nigel Stork (BMNH).

*Paratypes*: 1 ♂, 1 ♀, same data as holotype; 1 ♂, 1 ♀, same locality 5.ii.1985; 1 ♀, same locality 11.iii.1985; 3 ♀, same locality 11.vii.1985 (BMNH).

*Measurements* (3 ♂, 6 ♀). Body ♂ 9.3-10.3, ♀ 9.2-10.5; pronotum ♂ 3.6-4.0, ♀ 2.1-2.3; pronotum width ♂ 2.4-2.8, ♀ 1.9-2.2; tegmen ♂ 3.3-3.7; tegmen width ♂ 2.7-2.9; hind femur ♂ 5.3-5.6, ♀ 5.2-6.0; hind tibia ♂ 3.9-4.2, ♀ 3.9-4.6; hind metatarsus ♂ 1.2, ♀ 1.1-1.3; ovipositor ♀ 5.0-5.9 mm. – Ratio pronotum length to width ♂ 1.39-1.54, ♀ 1.0-1.17; ratio hind tibia to metatarsus ♂ 3.26-3.47, ♀ 3.25-3.65; ratio tegmen length to width ♂ 1.21-1.26.

*Description*. Frontal rostrum as wide as scapus, without medial furrow. Maxillary palps with apical segment widened and of about same length with third segment; fourth segment little shorter than third (Fig. 94). Pronotum ♂ with lateral margins widening posteriorly; posterior margin convex, covering tegmen to stridulatory vein or base of mirror (Fig. 24). ♂ tegmen of about same width with posterior area of pronotum or slightly wider; posterior margin convex; mirror roughly triangular (Fig. 37). Hind tibia distinctly shorter than hind femur but more than half as long; hind metatarsus shorter than half the length of hind tibia.

♂ abdomen. Supra-anal plate with tenth abdominal tergite distinctly divided from epiproct by a transverse suture; along suture with a bunch of long hairs at both sides of middle; apex rounded (Fig. 104). Paraproct process long and narrow, cylindrical, of general colour, with separate long hairs (Fig. 115). Subgenital plate with apical margin rounded, truncate to faintly concave in middle. Epiphallus membranous. Central lobe of phallus with lateral valves elongate, in apical area bent ventrad and both sides together almost forming a dorsally open tube; external sclerites well developed; medial valve with base widened and strongly curved, almost forming a spiral; internal sclerites at base expanded, afterwards elongate (Figs 172-174). Ventral lobe shorter than lateral valves.

♀ abdomen. Ninth abdominal tergite with apex concave. Supra-anal plate much narrower than ninth tergite; apex rounded (Fig. 132). Subgenital plate triangular in general outline; apex rounded and slightly excised in middle (Fig. 196). Ovipositor long; apical valves with margins smooth (Fig. 192).

*Colouration*. Medium brown, underside light brown to almost white. Head with frons whitish brown; antenna yellowish brown with indistinct spaced annulation; maxillary palps whitish brown, hardly marmorated. Pronotum with disc reddish brown; lateral lobes almost white. Tegmen yellowish transparent; tegmen at base and apex same as surface; lateral area same as disc. Legs usually light with dark marmoration. Abdomen ♂ dark brown above, almost white below. Subgenital plate dark brown. Cerci yellowish brown. Abdomen ♀ dark brown above, medium brown below. Subgenital plate dark brown. Cerci yellowish brown. Ovipositor yellowish brown; apical valves reddish brown.

*Discussion*. This and the preceding species are characterised by the male phallus with the external sclerites strongly developed, the lateral valves forming a tube in apical area, and the medial valve with the internal sclerites laterally expanded in the basal spermatophore sac area. Another common character of both species that separates them from other SE Asian *Ornebius* species are the rather long maxillary palps with the apical segment little widened. *O. dumoga* differs from *O. consternus* by the shorter

male pronotum that covers the tegmen only to the base of the mirror, and the narrow supra-anal plate. The latter character is especially striking in the female. Further characters that separate *O. dumoga* from other species are outlined in the key.

*Etymology.* Named after the type locality; noun in apposition.

***Ornebius flori* Ingrisch, 1998**

Figs 3-4, 121, 139-140

*Ornebius flori* Ingrisch, 1998: 226. Holotype (♂): East Malaysia: Sabah, Mt. Kinabalu NP, Poring, 500-700 m, 6° 5' N, 116° 33' E, canopy fogging, 27.x.1993 leg. A. Floren (ZFMK).

*New material.* East Malaysia: 10 ♂, 5 ♀, Sabah, Mt. Kinabalu NP, Poring, 500-700 m, canopy fogging, leg. A. Floren, 19.ii.-24.iii.1996; 10 ♂, 5 ♀, same locality, 11.x.-1.xi.1996; 2 ♂, 1 ♀, same locality, 9.ii.1997; 6 ♂, 4 ♀, same locality, 27.-28.iii.1998; 22 ♂, 31 ♀, Sorinsim, canopy fogging, leg. A. Floren, 27.ii.-12.iii.1997; 2 ♀, Kinabalu area, plantation, leg. A. Floren, 23.i.2001 (42 ♂, 40 ♀ ZFMK, 4 ♂, 4 ♀ MHNG, 4 ♂, 4 ♀ CI).

*Discussion.* The species is sufficiently described in Ingrisch (1998). New material became available since then. All specimens come from the Kinabalu area in Sabah, and *O. flori* may be restricted to that area. It was fogged from trees in primary and disturbed forests. Illustrations of the male phallic complex (Figs 139-140) are included here for comparison with *O. citrus* sp. n. and *O. pullus* sp. n.

*O. flori* and *O. citrus* are very similar in general habitus, but *O. flori* has the male tegmen (Fig. 3) dull yellow instead of bright yellow with the dark apical band broader than in *O. citrus*. Distinct differences are in the male the ejaculatory duct which has the apex truncate in *O. flori* but acute in *O. citrus* and in the length of the ovipositor which is 4.6-5.1 mm in *O. flori* against 6.1-6.6 mm in *O. citrus*. Differences against other species are outlined in the key. The medial valves of the male phallic complex of *O. flori* and are similar to that of *O. pullus*; the membranous parts of the phallus are however much more voluminous than in the latter. Both species differ strikingly in the colour of the tegmen. The paraproct process is longer than the main part of the paraproct in *O. flori* (Fig. 121) while of about the same length in *O. pullus* (Fig. 112).

***Ornebius imitatus* sp. n.**

Figs 28, 95, 129, 193, 202

*Holotype* (♀): Indonesia: West Java, Palabuan Ratu, Samudra beach, 6° 58' S, 106° 30' E, relic forest, 6.iii.1995, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♀). Body 8.2; pronotum: 2.1; pronotum width: 2.0; hind femur: 5.5; hind tibia: 4.1; hind metatarsus: 1.1; ovipositor: 6.5 mm. – Ratio pronotum length to width: 1.06; ratio hind tibia to metatarsus: 3.83.

*Description.* Frontal rostrum slightly wider than scapus; faintly furrowed in midline. Maxillary palps with apical segment widened; fourth and fifth segments of equal length, shorter than third segment (Fig. 95). Pronotum ♀ little longer than wide; scarcely narrowing in front; anterior and posterior margins feebly convex (Fig. 28). Hind femur 1.3x longer than hind tibia; hind tibia 3.8x longer than metatarsus.



♂ unknown.

♀ abdomen. Supra-anal plate bend in a 90°-angle ventrad in about middle of length; apical area semicircular; elevated in middle; apex convex and setose (Fig. 129). Paraprocts simple. Subgenital plate triangular; apex rounded (Fig. 202). Ovipositor apical valves with margins smooth (Fig. 193).

Colouration. Head reddish brown; frons black, mouthparts of lighter colour; maxillary palps yellowish brown. Antenna with scapus and pedicellus brown above, black below; flagellum yellowish brown. Pronotum reddish brown. Legs: basal two thirds of femur and metatarsus yellowish brown, apical third of femur and tibia dark brown to black; last joint of tarsus black. Abdomen ♀ black, anterior segments brown. Supra-anal plate black; apical area yellowish white. Subgenital plate black. Cerci yellowish brown, a little darkened towards apex. Ovipositor brown, apical valves dark brown.

*Discussion.* The new species is superficially similar to *O. samudra*. It differs by the black frons with pale yellow maxillary palps instead of reddish brown frons with black palps, more important however by the shape of the supra-anal plate which is wider at base and black, strongly bent ventrad in middle and almost white near apex. The maxillary palps have the fourth and fifth segments of equal length but both are a little shorter than the third segment. The differences against other species are outlined in the key.

*Etymology.* Named for the similar appearance to *O. samudra* with which it lives in the same habitat.

***Ornebius marginatus* Ingrisch, 1998**

Figs 10-11, 119, 135, 178-180

*Ornebius marginatus* Ingrisch, 1998: 226. Holotype (♂): East Malaysia: Sabah, Mt. Kinabalu NP, Poring, 500-700 m, 6° 5' N, 116° 33' E, canopy fogging, 20.01.1992, leg. A. Floren (ZFMK).

*New material.* East Malaysia: 1 ♂, Sabah, Mt. Kinabalu NP, Poring, 500-700 m, 6° 5' N, 116° 33' E, 1.iv.1994, leg. Hoffmann (ZFMK); 6 ♂, 11 ♀, same locality, canopy fogging, 19.ii.-24.iii.1996, leg. A. Floren; 2 ♀, 6.x.1996; 12 ♂, 11 ♀, 27-30.iii.1998 (13 ♂, 19 ♀, ZFMK, 2 ♂, 2 ♀ MHNG, 3 ♂, 3 ♀, CI); 36 ♂, 53 ♀, Crocker Range, near village Bandukan-Keningau, 5° 26' N, 116° 8' E, canopy fogging, 18.ii.2001, leg. A. Floren; 58 ♂, 97 ♀, Crocker Range, near village Ulu Liawan, 5° 24' N, 116° 5' E, canopy fogging, 20-21.ii.2001, leg. A. Floren (78 ♂, 134 ♀, ZFMK, 8 ♂, 8 ♀ MHNG, 8 ♂, 8 ♀, CI); 1 ♂, 5 ♀, Kinabalu area, plantation, canopy fogging, 23.i.2001, leg. A. Floren (ZFMK); 1 ♂, 1 ♀, Sorinsim, canopy fogging, 9.iii.1997, leg. A. Floren (CI).

*Measurements* of specimens from Crocker Range (32 ♂, 30 ♀). Body ♂ 6.3-9.3, 7.8±0.7, ♀ 5.9-8.7, 7.2±0.6; pronotum ♂ 2.5-3.2, 2.7±0.1, ♀ 1.7-2.0, 1.9±0.1; pronotum width ♂ 2.0-2.3, 2.1±0.1, ♀ 1.5-1.8, 1.6±0.1; tegmen ♂ 3.3-3.8, 3.6±0.2; tegmen width ♂ 2.6-3.1, 2.9±0.1; hind femur ♂ 3.6-4.5, 4.2±0.3, ♀ 4.2-4.6, 4.4±0.1; hind tibia ♂ 3.0-3.5, 3.2±0.3, ♀ 3.2-3.7, 3.4±0.2; hind metatarsus ♀ 1.0-1.1, 1.1±0.1; ovipositor ♀ 3.3-4.1, 3.7±0.2 mm. – Ratio pronotum length to width ♂ 1.2-1.51, 1.3±0.1, ♀ 1.02-1.29, 1.1±0.1; ratio hind tibia to metatarsus ♀ 2.99-3.32, 3.2±0.2; ratio tegmen length to width ♂ 1.18-1.31, 1.2±0.

*Discussion.* The species was described from the Kinabalu area in Sabah. New material became available since then. Most of the new specimens were collected near the villages Bandukan-Keningau and Ulu Liawan in the Crocker Range. These

specimens from Crocker Range are in the mean little but distinctly smaller than those from Poring where the original type series came from. The differences concern pronotum, male tegmen, and hind legs, but not the ovipositor. Colouration is more variable than in specimens from Poring: The black band at the hind margin of the male tegmen can be more or less reduced to dark spots at both lateral angles; the dark spots at both basal angles and in the centre of the disc can be present or not, often the disc is suffused with pale brown flecks or the veins are dark brown and the membrane almost white. The male genitalia as the paraproct process and the phallus agree with those of specimens from Poring.

*O. marginatus* is unique for the paraproct processes in male which are not longer than the paraproct height, compressed, in lateral view nearly ovoid, and strongly setose. In other species with similar short paraproct processes as *O. pullus*, *O. angustifrons*, or *O. brevipalpus* they are rounded. The medial valves of the male phallic complex form an unpaired, roughly triangular sclerite that covers the apical areas of the internal sclerites and the ejaculatory duct (Fig. 178). A character not found so far in other *Ornebius* species. The female can be recognised by the short ovipositor (3.1-4.1 mm) with smooth apical valves and the supra-anal plate with the apical area transverse (Fig. 135).

***Ornebius peniculatus* sp. n.**

Figs 18, 35, 91, 101, 109, 165-167

*Holotype* (♂): Thailand: Tak prov., Mae Salit, Monkrating, trek over Doi Kathing, 700-1250 m, 17° 30' N, 98° 5' E, 15.v.1988, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♂). Body 9.1; pronotum 2.8; pronotum width 2.3; tegmen 2.5; tegmen width 2.5; hind femur 5.0; hind tibia 3.6; hind metatarsus 1.1 mm. – Ratio pronotum length to width 1.22; ratio hind tibia to metatarsus 3.36; ratio tegmen length to width 1.0.

*Description*. Frontal rostrum slightly wider than scapus, faintly furrowed in midline; vertex plain. Maxillary palps with apical segment distinctly widened; all three apical segments of subequal, medium length (Fig. 91). Pronotum ♂ with anterior dorsal margin feebly concave; lateral margins slightly widening posteriorly; posterior margin convex, covering base of mirror (Fig. 18). ♂ tegmen slightly wider than posterior area of pronotum; posterior margin convex (Fig. 35). Hind femur 1.4x longer than hind tibia; hind tibia 3.4x longer than metatarsus.

♂ abdomen. Supra-anal plate with strongly converging margins in basal two thirds, faintly converging margins in apical third; both areas separated by a fold; basal area grooved in middle and with two bunches of hairs at the end of the groove; apical area swollen in middle; apex convex (Fig. 101). Paraproct process long and narrow, cylindrical, black, on proximo-internal margin attached to a white membrane, a little compressed at base and furrowed on external side (Fig. 109). Subgenital plate basal half with parallel margins, apical half broadly rounded and with upcurved margins; apex notched. Phallus with external sclerites forming compressed, elongate plates, that are less sclerotised than in *O. tuberculatus*; bent somewhat ventrad in middle of length (Fig. 167). Medial valve thin, with a small, hyaline projection at base; internal sclerites distinctly curved (Figs 165-167).

♀ unknown.

Colouration. Reddish brown and black. Head reddish brown; tip of frontal rostrum faintly infumate; antenna with scapus and pedicellus brown, flagellum light brown; maxillary palps light brown. Pronotum reddish brown. Tegmen yellowish transparent, at apex with a broad black band; lateral area same as disc. Legs pale yellow with medium and dark brown scales; last two joints of tarsi darkened. Abdomen including supra-anal and subgenital plates black. Cerci yellowish brown with black infumation.

*Discussion.* The new species is closely related to *O. tuberculatus*. It differs by the absence of a transverse swelling on vertex and by details of the male genitalia. The differences to other species are outlined in the key.

*Etymology.* The name refers to the brushes of hairs on the supra-anal plate; from Latin peniculus = brush.

*Ornebius pullus* sp. n.

Figs 5, 40, 100, 112, 147-150

*Holotype* (♂): Brunei: Brunei-Muara District, near the bridge over the river Sungai Lubang Barus on the road coming from Tutong, 33 km from Bandar Sen Begawan, 20 m, 16.xi.1988, leg. Charles Lienhard (MHNG).

*Measurements* (1 ♂). Body 7.8; pronotum 2.4; pronotum width 2.0; tegmen 2.4; tegmen width 2.2; hind femur 4.2; hind tibia 2.8; hind metatarsus 1.2 mm. – Ratio pronotum length to width 1.23; ratio hind tibia to metatarsus 2.37; ratio tegmen length to width 1.08.

*Description.* Frontal rostrum slightly wider than scapus, without medial furrow. Pronotum ♂ with lateral margins slightly widening posteriorly; posterior margin convex, covering tegmen to base of mirror (Fig. 5). ♂ tegmen broader than pronotum; posterior margin convex; mirror roughly triangular, as long as wide (Fig. 40). Hind femur 1.5x longer than hind tibia; hind tibia 2.4x longer than metatarsus.

♂ abdomen. Supra-anal plate with tenth abdominal tergite distinctly delimited from epiproct; tenth tergite slightly grooved in middle; apical margin very little concave with a bunch of long hairs at both sides of middle; epiproct much narrower than tenth tergite, rounded (Fig. 100). Paraproct process long, compressed, curved, of light colour, with separate long hairs (Fig. 112). Subgenital plate apical margin rounded and notched in middle. Epiphallus membranous, tongue-shaped, covering most of central lobe. Central lobe of phallus with lateral valves dorso-ventrally compressed with acute apex, completely hyaline; medial valve with internal sclerites almost forming a tube; ejaculatory duct with apex truncate and a little notched (Figs 147-150).

♀ unknown.

Colouration. Medium brown, underside light brown to almost white. Frons yellowish brown with dark ornaments. Antenna with scapus and pedicellus brown; flagellum light with spaced dark annulation. Labial palps almost white; [maxillary palps missing]. Pronotum apical margin with white scales. Tegmen transparent dark brown, at apex with a diffuse blackish brown band; lateral area same as disc. Legs light with dark marmoration; fore and mid tibiae with dark rings. Abdomen ♂ brown above, almost white below. Cerci yellowish brown.

*Discussion.* As in other *Ornebius* species from North Borneo (*O. flori*, *O. citrus*, *O. rubidus*, *O. vadus*), *O. pullus* has the lateral valves of the male phallic complex

completely membranous. It differs from all but *O. flori* by the shape of the medial valve. While *O. citrus*, *O. rubidus*, *O. vadus* have the internal sclerites dorso-ventrally compressed and the ejaculatory duct with acute apex, in *O. flori* and *O. pullus* the internal sclerites forming together a narrow tube and the ejaculatory duct has the apex faintly widened and truncate; the membranous parts of the phallic complex differ however considerably between both species. Apart from colouration, *O. pullus* differs from *O. flori* by the narrow epiproct. The latter character resembles the situation in *O. marginatus*. This species has however a completely different shaped body and colouration, and differs also by the phallic complex and the short and wide paraproct process. Differences to other species are outlined in the key.

*Etymology.* The name refers to the dark brown colour of the tegmina; from Latin pullus = blackish-brown.

***Ornebius rubidus* Ingrisch, 1998**

Figs 6-7, 122, 136, 151-154

*Ornebius rubidus* Ingrisch, 1998: 228. Holotype (♂): East Malaysia: Sabah, Mt. Kinabalu NP, Poring, 500-700 m, 6° 5' N, 116° 33' E, canopy fogging, leg. A. Floren, 3.iv.1993 (ZFMK).

*New material.* East Malaysia: 2 ♀, Sabah, Mt. Kinabalu NP, Poring, 500-700 m, canopy fogging, leg. A. Floren, 18.-19.iii.1996; 1 ♂, 3 ♀, 6.x.1996-7.xi.1996 (4 ♀, ZFMK; 1 ♂, 1 ♀, CI).

*Additional description.* ♂ abdomen. Epiphallus triangular, membranous, covering ectophallus completely (Fig. 151). Central lobe with lateral valves terminating into semi-hyaline, compressed lobes; apices of lobes obliquely truncate; medial valve curved at base; internal sclerites distinct, flattened (Figs 152-154).

*Discussion.* *O. rubidus* is so far only known from canopy fogging in the Poring area of Mt. Kinabalu. Few new specimens became available since the original description, all from the type locality. The species is sufficiently described in Ingrisch (1998). Illustrations of the phallic complex before (Fig. 151) and after cleaning in KOH solution (Figs 152-154) are included to show the difference between the outline of the membranous parts of alcohol conserved preparation and the sclerotised parts.

*O. rubidus* belongs together with *O. vadus* and *O. citrus* to a group of species in which the medial valves of the male phallic complex have strongly sclerotised, compressed internal sclerites with acute apex and the base bent dorsad to support the spermatophore sac, while the lateral valves are largely membranous. *O. rufonigrus* has similar internal sclerites while the lateral valves show stronger sclerotisation. The species differ from each other by the shapes of the supra-anal plate in both sexes, the paraproct processes in male, ovipositor length in female, and by size and colouration.

***Ornebius rufonigrus* Ingrisch, 1987**

Figs 122a, 134

*Ornebius rufonigrus* Ingrisch, 1987: 173. Holotype (♂): Thailand: Nakhon Si Thammarat, Koh Samui, Hin Lad Falls, 9° 31' N, 98° 58' E, 8.x.1985, leg. S. Ingrisch (SMF).

*Measurements* (1 ♂, 2 ♀). Body ♂ 10, ♀ 12-12.5, 12.3±0.4; pronotum ♂ 4, ♀ 2.7-2.9; tegmen ♂ 3.8; hind femur ♂ 6.8, ♀ 7-8; hind tibia ♂ 5.3, ♀ 5.1-6.3; hind metatarsus ♂ 1.6, ♀ 1.4-1.8; ovipositor ♀ 9 mm. – Ratio hind tibia to metatarsus ♂ 3.31 ♀ 3.5-3.64.



**Redescription.** Frontal rostrum as wide as scapus, indistinctly furrowed in mid-line. Maxillary palps with apical segment slightly widened; fourth segment shorter than third and fifth segments. Pronotum ♂ with anterior margin subtruncate; lateral margins widening posteriorly; posterior margin convex, covering stridulatory vein of tegmen; Pronotum ♀ narrowing in front; anterior and posterior margins substraight. Anterior tibia with small internal tympanum. Hind femur 1.3-1.4x longer than hind tibia; hind tibia 3.3-3.6x longer than metatarsus.

♂ abdomen. Supra-anal plate with apical margin truncate. Paraproct process long and narrow, cylindrical, black, slightly curved, apex acute (Fig. 122a). Subgenital plate triangular with margins upcurved, apex rounded. Lateral valves weakly sclerotised, hyaline; little sinuate, apex acute; medial valve elongate, with spear-like internal sclerites.

♀ abdomen. Supra-anal plate with strongly narrowing lateral margins; epiproct with converging margins, apex rounded (Fig. 134). Subgenital plate rounded with lateral margins upcurved, little notched at apex. Ovipositor long; apical valves with margins smooth.

**Colouration.** Reddish brown and black. Head reddish brown; mouthparts, maxillary palps and antenna yellowish brown. Pronotum reddish brown. Tegmen yellowish transparent. Legs yellowish brown. Abdomen ♂ black. Abdomen ♀ black, anterior segments brown. Cerci yellowish brown.

**Discussion.** As the species was originally described in German, a short redescription is given here. Only the type series (1 ♂, 2 ♀) is known so far. The male phallic complex has the internal sclerites strongly sclerotised as in *O. flori*, *O. citrus*, *O. rubidus*, and *O. vadus*. Apart from details, it differs in that also the lateral valves bear a distinct sclerotisation. The latter character resembles the situation in *O. aureus*, *O. cibodas*, *O. peniculatus*, *O. samudra*, and *O. tuberculatus*. *O. rufonigrus* differs by the strongly sclerotised internal sclerites and details of different part of the phallic complex. General differences to other species are outlined in the key.

***Ornebius samudra* sp. n.** Figs 19-20, 39, 97, 106, 117, 123, 168-169, 189, 199, 358-359, 366, 373-374

**Holotype** (♂): Indonesia: West Java, Palabuan Ratu, Samudra beach, relic forest, 6° 58' S, 106° 30' E, 5.iii.1995, leg. S. Ingrisch (ZFMK).

**Paratypes:** 3 ♂, 2 ♀, same locality as holotype, 12.ii.1995; 1 ♂, 3.-6.iii.1995 (1 ♀, ZFMK; 3 ♂, CI; 1 ♂, MBBJ).

**Measurements** (4 ♂, 2 ♀). Body ♂ 9.9-11.1, ♀ 9.6-11.2; pronotum ♂ 3.5-3.6, ♀ 2.3-2.4; pronotum width ♂ 2.6-2.7, ♀ 2.1-2.2; tegmen ♂ 2.8-3.0; tegmen width ♂ 2.8-3.0; hind femur ♂ 5.6-6.1, ♀ 5.9-6.4; hind tibia ♂ 4.3-4.7, ♀ 4.7-4.8; hind metatarsus ♂ 1.2-1.3, ♀ 1.26; ovipositor ♀ 6.2 mm. – Ratio pronotum length to width ♂ 1.28-1.39; ♀ 1.08-1.09; ratio hind tibia to metatarsus ♂ 3.58-3.68; ♀ 3.70-3.80; ratio tegmen length to width ♂ 0.98-1.09.

**Description.** Frontal rostrum as wide as scapus, faintly furrowed in midline. Maxillary palps with apical segment widened; fourth segment little shorter than third and fifth segments (Fig. 97). Pronotum ♂ with anterior dorsal margin feebly concave; lateral margins widening posteriorly; posterior margin convex, covering tegmen to

base of mirror (Fig. 19). Pronotum ♀ little longer than wide; scarcely narrowing in front; anterior margin feebly convex; posterior margin substraight (Fig. 20). ♂ tegmen slightly wider than posterior area of pronotum; posterior margin convex (Fig. 39). Hind femur 1.2-1.4x longer than hind tibia; hind tibia 3.6-3.8x longer than metatarsus.

♂ abdomen. Supra-anal plate with a single brush of short hairs behind middle arising from behind a small fold; surface matt with few smooth spots; apex subtruncate (Fig. 106). Paraproct process black, compressed in basal area, faintly widened in middle, apical area styliform (Fig. 117). Subgenital plate rounded with margins upcurved and apex excised. Epiphallus membranous. Medial lobe of phallus with lateral valves compressed, forming together a ventrally open, elongate tube; external sclerites angularly bent in middle. Medial valve forming at base an irregular frame that embraces the hyaline spermatophore sac; internal sclerites narrow, hardly curved at base (Figs 168-169). Ventral lobe forming two rounded lobes.

♀ abdomen. Supra-anal plate with parallel lateral margins in apical half; elevated in middle; apex convex and setose (Fig. 123). Paraprocts simple. Subgenital plate roof-shaped; apex truncate and little notched (Fig. 199). Ovipositor of medium length; apical valves with margins smooth; ventral margin of dorsal valves with 4-6 bristles (Fig. 189).

Colouration. Reddish brown. Frons reddish brown; antenna with scapus and pedicellus reddish brown, flagellum yellowish brown; maxillary palps with basal two segments orange, third segment brown or black, apical two segments black. Pronotum reddish brown. Tegmen bright orange; lateral area same as disc. Legs light with dark marmoration; usually last joint of tarsi black. Abdomen ♂ brown with black scales from above, light brown below. Subgenital plate black. Cerci yellow, darker towards apex. Abdomen ♀ black, anterior segments brown. Supra-anal plate black, about basal two thirds matt with matt area angular behind, apical area smooth; lateral appendages brown. Subgenital plate black. Cerci as in male. Ovipositor yellowish brown.

*Discussion.* The new species is well characterised in the male by the supra-anal plate carrying a single brush of short hairs and by the very long paraproct process which is widened in middle and with styliform apex. The male phallic complex resembles the situation in *O. aureus*, *O. tuberculatus*, *O. peniculatus*, *O. cibodas*. *O. samudra* differs by the before mentioned characters and the uniform colour of the tegmen. The female is characterised by the matt surface of about basal two thirds of the supra-anal plate. It is similar to *O. nigripes* Chopard, 1927. It differs by the tibia being yellow instead of black, by larger size (hind femur mean 6.1 against 5.0 mm), and by the longer ovipositor (mean 6.2 against 4.5 mm). Differences to other species are outlined in the key.

*Etymology.* Named after the type locality; noun in apposition.

*Stridulation.* The calling song consists of an irregular sequence of chirp groups. Both, the number of the chirps per group and the chirp group interval vary. Each chirp consists of three to seven pulses (mean  $5 \pm 1.1$ ,  $n=25$ ). All except the last pulse of a chirp following immediately after each other while the last pulse follows after a short pause with this pause being longer than the pause between two succeeding chirps. In the evening (22:00 h) at 25.5°C (Figs 359, 366, 374), chirp duration was 370-486 ms (mean  $425 \pm 35.6$ ,  $n=25$ ), the pause between the penultimate and last pulse of a chirp

149-235 ms (mean  $191 \pm 19.9$ ), and the pause between two succeeding chirps 86-157 ms (mean  $115 \pm 17.6$ ). Frequency maximum was about 6.2-6.8 kHz. In the morning (6:30 h, 25°C, Figs 358, 373), the chirp structure was principally the same but the chirp sequences were reduced to 2 chirps with the second chirp often reduced, missing the last pulse. Frequency maximum was a little lower 5.8-6.4 kHz; but this could have been due to a different substratum on which the singing cricket was sitting.

*Ornebius serratus* sp. n.

Figs 21, 88, 128, 187, 201

*Holotype* (♀): Thailand: Chiang Mai prov., 11 km NE Samoeng, 1100-1200 m, 18° 52' N, 98° 48' E, 29.v.1997, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♀). Body 8.9; pronotum 2.1; pronotum width 1.8; hind femur 5.5; hind tibia 3.6; hind metatarsus 1.2; ovipositor 4.9 mm. – Ratio pronotum length to width 1.18; ratio hind tibia to metatarsus 2.99.

*Description*. Frontal rostrum slightly wider than scapus, with a faint medial suture. Maxillary palps with apical segment widened and of about same length with third segment; fourth segment shorter than third and fifth segments (Fig. 88). Pronotum ♀ little longer than wide; scarcely narrowing in front; anterior and posterior margins feebly convex (Fig. 21). Hind femur 1.5-1.6x longer than hind tibia; hind tibia 3x longer than metatarsus.

♂ unknown.

♀ abdomen. Ninth abdominal tergite with apex feebly concave. Supra-anal plate small, with apex subtruncate; with small lateral projections. Epiproct almost rectangular; with an apical swelling; apex slightly convex and setose (Fig. 128). Paraprocts with a vertical swelling but not forming a carina. Subgenital plate triangular with margins upcurved; apex notched (Fig. 201). Ovipositor of medium length; apical valves on dorsal margin with hardly visible minute denticles, ventral margin with 6-8 small teeth; ventral margin of dorsal valves with 4-6 bristles (Fig. 187).

Colouration. Reddish brown and black. Head with vertex and frons reddish brown; genae, antennae and maxillary palps yellowish brown. Pronotum reddish brown, lateral lobes yellowish brown. Legs yellow with black and brown marmoration. Abdomen dorsal side black with shining scales, ventral side dark grey and segments with white posterior margin. Supra-anal plate with base and apex black, otherwise yellow. Subgenital plate black. Cerci yellow, suffused with black scales except at base. Ovipositor reddish brown.

*Discussion*. Although the new species is known by a single female, it is described as new, because morphology and colour pattern of the supra-anal plate readily allow to separate it from related species. It belongs to the few species in which the ovipositor apical valves are dentate. It is close to *O. aureus* and *O. angustus*. It differs from both by the shape of the supra-anal plate (Figs 126-128) and shorter ovipositor (4.9 mm against 6.3-6.9 mm). For the recognition of the corresponding male, colouration of head and pronotum might be useful. Both are reddish brown from above while the genae, maxillary palps and lateral lobes of pronotum are yellowish brown. Differences to other species are lined out in the key.

*Etymology*. The name refers to the serration of the ventral margin of the ovipositor apical valves; from Latin *serra* = saw.

*Ornebius tuberculatus* sp. n.

Figs 16-17, 36, 87, 107, 110, 130, 162-164, 191

*Holotype* (♂): Thailand: Loei prov., Phu Kradung, 1500 m, 16° 55' N, 101° 47' E, 27.-29.v.1988, leg. S. Ingrisch (ZFMK).

*Paratype*: 1 ♀, same data as holotype: (ZFMK).

*Measurements* (1 ♂, 1 ♀). Body ♂ 9.9, ♀ 9.6; pronotum ♂ 3.2, ♀ 2.0; pronotum width ♂ 2.3, ♀ 1.8; tegmen ♂ 3.0; tegmen width ♂ 2.5; hind femur ♂ 5.0, ♀ 5.1; hind tibia ♂ 3.7, ♀ 3.7; hind metatarsus ♂ 1.2, ♀ 1.2; ovipositor ♀ 6.6 mm. — Ratio pronotum length to width ♂ 1.38, ♀ 1.07; ratio hind tibia to metatarsus ♂ 3.1, ♀ 3.04; ratio tegmen length to width ♂ 1.2.

*Description*. Frontal rostrum slightly wider than scapus, faintly furrowed in midline; vertex in male with a transverse carina (Fig. 16, arrow). Maxillary palps with apical segment distinctly widened; all three apical segments of subequal, medium length (Fig. 87). Pronotum ♂ with anterior dorsal margin subtruncate; lateral margins widening posteriorly; posterior margin convex, covering tegmen to base of mirror (Fig. 16). Pronotum ♀ almost as wide as long; scarcely narrowing in front; anterior and posterior margins feebly convex (Fig. 17). ♂ tegmen slightly wider than posterior area of pronotum; posterior margin convex (Fig. 36). Hind femur 1.3-1.4x longer than hind tibia; hind tibia 3.1x longer than metatarsus.

♂ abdomen. Supra-anal plate divided by a straight transverse fold; shallowly grooved in middle; setose along transverse fold and with two brushes of dense short hairs; apical area small, bulging, wider than long; apex convex and setose (Fig. 107). Paraproct process long, compressed, curved, black; basal area laterally furrowed, apical area styliform (Fig. 110). Subgenital plate triangular with margins upcurved; apex notched. Phallus with external sclerites forming compressed, elongate plates; bent somewhat ventrad in middle of length (Fig. 164). Medial valve thin, internal sclerites flattened, little curved (Figs 162-164).

♀ abdomen. Ninth abdominal tergite with apex concave. Supra-anal plate in basal part with two black triangular plates and the lateral projections; apical part rounded, surface swollen, convex; apex convex and setose (Fig. 130). Paraprocts simple. Subgenital plate triangular with margins upcurved; apex rounded. Ovipositor of medium length; apical valves with dorsal margin smooth, ventral margin with 6-8 small teeth; ventral margin of dorsal valves with 4-6 bristles (Fig. 191).

*Colouration*. Reddish brown and black. Head black; antenna with scapus and pedicellus black, flagellum medium brown; maxillary palps dark brown. Tegmen yellowish transparent, at apex with a broad black band; lateral area same as disc. Legs pale yellow; tibiae and hind knees infumate; last two joints of tarsi black. Abdomen ♂ including supra-anal and subgenital plates black. Cerci yellow, darker towards apex. Abdomen ♀ including subgenital plate black. Supra-anal plate blackish brown with an inverse T-shaped yellowish brown band in basal half. Cerci as in male. Ovipositor brown.

*Discussion*. The new species is unique for the transverse swelling on the vertex of the male. Otherwise it is close to *O. peniculatus*. It differs, apart from the vertex, by the head being black instead of reddish brown, the supra-anal plate with the margin between the tenth tergite and epiproct straight instead of curved, the internal sclerites of the phallus only faintly curved, and the spermatophore sac with sclerotised margins.



The species *O. cibodas* and *O. aureus* are also close. *O. tuberculatus* differs from *O. cibodas* by the black head and abdomen, the male pronotum not strongly widened posteriorly, the brushes of hairs on the supra-anal plate not standing on papillae, the paraproct process upcurved, and the external sclerites of the phallus more distinct. From *O. aureus* it differs by the colour pattern, and smaller differences in the supra-anal plate, paraprocts and phallic complex. The female is similar to *O. angustus*. It differs by different shape and colour pattern of the supra-anal plate, the dorsal margin of the ovipositor apical valves being smooth, and the body narrower. Differences to other species are outlined in the key.

*Etymology.* The name refers to the transverse swelling on the male vertex; from Latin tuber = swelling.

*Ornebius vadus* Ingrisch, 1998

Figs 8-9, 120, 138, 155-159

*Ornebius vadus* Ingrisch, 1998: 228. Holotype (♂): East Malaysia: Sabah, Mt. Kinabalu NP, Poring, 500-700 m, 6° 5' N, 116° 33' E, canopy fogging, 1.ii.-30.xi.1993, leg. A. Floren (ZFMK).

*New material.* East Malaysia: 2 ♀, Sabah, Mt. Kinabalu NP, Poring, 500-700 m, canopy fogging, 19.-26.ii.1996; 1 ♂, 2 ♀, 6.x.-7.xi.1996; 1 ♀, 30.iii.1998; 4 ♂, 3 ♀, Sorinsim, canopy fogging, 27.ii.-8.iii.1997, leg. A. Floren (4 ♂, 6 ♀ ZFMK, 1 ♂, 2 ♀ CI).

*Discussion.* The species is sufficiently described in Ingrisch (1998). Illustrations of the cleaned phallic sclerites (Figs 157-159) are included here and compared to the external shape of the membranous parts of the phallus (Figs 155-156). *O. vadus* has the internal sclerites of the male phallic complex similar to the situation in *O. rubidus*, *O. rufonigrus* and *O. citrus*, although with the dark brown colour of head, pronotum and tegmen it looks quite different (Fig. 8). Distinctive characters against those species are the shape of the basal area of the internal sclerites (Fig. 158), the paraproct processes in the male which are about twice as long as the paraproct height and have a subapical swelling (Fig. 120), and the shapes of the supra anal plate in both sexes.

*Apterornebius* gen. n.

*Type species:* *Apterornebius kinabalu* sp. n., here designated.

*Description.* Medium sized Mogoplistinae crickets with dorso-ventrally compressed, ovoid body (Figs 42-44). Frontal rostrum of subequal width with scapus. Maxillary palps with apical segment moderately widened, third and fifth segments longer than fourth segment (Figs 207-208). Pronotum similar in both sexes, not prolonged; posterior margin subtruncate. Both sexes apterous. Fore tibiae without tympana. Hind tibiae little shorter than hind femur, three to four times longer than metatarsus.

♂ abdomen. Supra-anal plate still with a distinct borderline between tenth abdominal tergite and epiproct (Fig. 213). Paraprocts with process (Fig. 212). Phallic complex largely membranous, but internal sclerites well sclerotised (Figs 221-222).

♀ abdomen. Tenth abdominal tergite fused with epiproct (Figs 214-215). Ovipositor apical valves with margins smooth (Figs 194-195).

*Discussion.* The new genus is characterised by its apterous condition, lack of tibial tympana, the frontal rostrum being about as wide as scapus, and a compressed,

ovoid body. The first two characters it shares with *Arachnocephalus* Costa, 1855. The type species of this genus, *A. vestitus* Costa, 1855, however has a narrow, cylindrical body, the frontal rostrum about one and half times wider than scapus, the maxillary palps short instead of elongate, and the ovipositor apical valves have the ventral margin of the dorsal valves serrulate. In general habitus, *Apterornebius* resembles *Ornebius* Guérin, 1844. It differs, apart from the lack of wings and tibial tympana, by the short pronotum in the male and different structure of the male phallic complex. The short male pronotum resembles the condition in *Gortvendia* Bolívar, 1927. This genus however has a wide frontal rostrum, tibial tympana, wings, and the male phallus not sclerotised.

*Etymology.* The name is composed of the prefix apter- and the generic name *Ornebius*, reflecting the similarity to the latter genus plus its apterous condition.

#### KEY TO SPECIES

- 1 Maxillary palps of normal length (Fig. 207). Ovipositor gently curved (Fig. 195). Subgenital plate broad (Fig. 206). ♀ supra-anal plate with basal part shorter and baso-lateral appendages longer (Fig. 214). ♂ phallic complex as in Figs 221-222. Sabah (Kinabalu area) . . . *A. kinabalu* sp. n.
- Maxillary palps with prolonged segments (Fig. 208). Ovipositor straight (Fig. 194). Subgenital plate triangular (Fig. 205). ♀ supra-anal plate with basal part longer and baso-lateral appendages shorter (Fig. 215). South Thailand (Trang) . . . . . *A. chong* sp. n.

#### *Apterornebius chong* sp. n.

Figs 42, 194, 205, 208, 215

*Holotype* (♀): Thailand: Trang, Khao Chong, 7° 30' N, 99° 50' E, 23.-24.x.1991, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♀). Body 9.2; pronotum 2.5; pronotum width 2.4; hind femur 6.6; hind tibia 5.4; hind metatarsus 1.4; ovipositor 4.0 mm. – Ratio pronotum length to width 1.05; ratio hind tibia to metatarsus 3.9.

*Description.* Frontal rostrum as wide as scapus, with a faint medial suture. Maxillary palps long with apical segment slightly widened; fourth segment little shorter than third and fifth segment (Fig. 208). Pronotum ♀ almost as wide as long; scarcely narrowing in front; anterior and posterior margins substraight (Fig. 42). Anterior tibia without open tympanum. Hind femur 1.2x longer than hind tibia; hind tibia 3.9x longer than metatarsus.

♂ unknown.

♀ abdomen. Ninth abdominal tergite shortened. Tenth abdominal tergite hidden under ninth tergite: apex truncate and with small lateral projections; epiproct small, rounded (Fig. 215). Paraprocts simple. Subgenital plate triangular with margins up-curved; apex notched (Fig. 205). Ovipositor of medium length, slightly curved; apical valves with margins smooth, ventral margin of dorsal valves with 4-6 bristles (Fig. 194).

*Colouration.* Dark reddish brown and black. Head dark reddish brown; vertex and genae with black scales; antenna with scapus and pedicellus brown, base of flagellum black, afterwards brown; maxillary palps brown. Pronotum dark reddish brown; disc with black scales; lateral lobes and apex with white scales. Legs brown

with areas of black scales and of white scales; last joint of tarsi darkened. Abdomen ♀ with first segments brown, afterwards black covered with brown scales mixed with white scales mainly on underside of abdomen. Supra-anal plate dark brown along margins, whitish brown towards middle. Subgenital plate black. Cerci yellow, becoming black behind basal third. Ovipositor reddish brown.

*Discussion.* *A. chong* differs from *A. kinabalu* by the very long maxillary palps (Fig. 208), the female supra-anal plate (Fig. 215), and colouration.

*Etymology.* Named after the type locality; noun in apposition.

***Apterornebius kinabalu* sp. n.**

Figs 43-44, 195, 206-207, 212-214, 221-222

*Holotype* (♂): East Malaysia: Sabah, Sorinsim, canopy fogging, 2.iii.1997, leg. A. Floren (ZFMK).

*Paratypes*: 1 ♂, same data as holotype (ZFMK); 1 ♂, 1 ♀, same locality 27.ii.1997 (CI); 1 ♀, Sorinsim [Bergil], 7.iii.1997, leg. A. Floren (ZFMK).

*Measurements* (3 ♂, 2 ♀). Body ♂ 8.8-10.3, ♀ 9.4-10.2; pronotum ♂ 2.3-2.7, ♀ 1.9-2.3; pronotum width ♂ 2.0-2.3, ♀ 2.0-2.1; hind femur ♂ 5.1-5.7, ♀ 5.3-5.6; hind tibia ♂ 3.8-4.8, ♀ 4.4-4.7; hind metatarsus ♂ 1.1, ♀ 1.1-1.4; ovipositor ♀ 3.8-4.1 mm. – Ratio pronotum length to width ♂ 1.09-1.17, ♀ 0.94-1.12; ratio hind tibia to metatarsus ♂ 3.43-4.3, ♀ 3.46-3.98.

*Description.* Frontal rostrum slightly wider than scapus or of subequal width; faintly furrowed in midline and of about same length as third segment; fourth segment shorter than apical or third segments. Pronotum ♂ with lateral margins very little widening posteriorly; posterior margin subtruncate (Fig. 43). Pronotum ♀ as long as wide; lateral margins slightly convex; anterior margin straight; posterior margin subtruncate (Fig. 44). Both sexes apterous. Fore tibia without open tympanum; hind tibia little shorter than hind femur; dorsal margins serrate with 27-36 denticles and with single bristles; hind metatarsus much shorter than half the length of hind tibia.

♂ abdomen. Supra-anal plate with lateral areas reduced; central area rhombic; borderline between tenth abdominal tergite and epiproct concave, setose; epiproct large, rounded (Fig. 213). Paraproct process conical but compressed, curved, apex acute; dark brown; with single hairs (Fig. 212). Subgenital plate apical margin rounded and notched in middle. Epiphallus membranous; lateral valves forming membranous sacculi with internal margins sclerotised; medial valve with sclerites forming a spear-like structure (Figs 221-222).

♀ abdomen. Epiproct rounded (Fig. 214). Subgenital plate triangular; apex notched (Fig. 206). Ovipositor of medium length, slightly curved; apical valves with margins smooth (Fig. 195).

Colouration. Dark brown, pubescent. Vertex with 4 small black spots between antennae; antenna brown; maxillary palps yellowish brown. Pronotum dark reddish brown. Legs dark reddish brown; hind femur marmorated. Abdomen ♂ black, anterior segments brown. Cerci yellowish brown. Abdomen ♀ black, anterior segments brown. Ovipositor brown.

*Discussion.* *A. kinabalu* differs from *A. chong* by the shorter maxillary palps (Fig. 207), the gently curved ovipositor (Fig. 195) and the female supra-anal plate (Fig. 214).

*Etymology.* Named after the type locality; noun in apposition.

*Ectatoderus* Guérin-Méneville, 1847

*Ectatoderus* Guérin-Méneville, 1847: 336; Otte *et al.*, 2005.

*Type species: Ectatoderus nigriventris* Guérin-Méneville, 1847, by monotypy

*Diagnosis.* Frontal rostrum about as wide as scapus. Anterior tibia with internal tympanum. Males with wings reduced to stridulatory apparatus. Pronotum prolonged, covering tegmen almost completely (Figs 46-47).

*Discussion.* 35 species were currently assigned to *Ectatoderus*, occurring in all continents except Australia and Europe. It is however probable that they do not form a natural, monophyletic group but they are placed in the same genus because of some superficial similarity. This even applies to the Asian species alone. Two of them (*E. pallidegeniculatus* Brunner, 1893 and *E. sandrasagarai* Fernando, 1957) are probably better assigned to *Micronebius*, but I have not seen the types. They are not included in the key.

The Asian species of *Ectatoderus* differ from *Ornebius* mainly by the prolonged pronotum. Two of the three species with prolonged pronotum studied in this paper, differ in the male phallic complex from the Asian *Ornebius* species. They are described under *Ectatoderus* as currently understood. The third species however, from Sulawesi, has the male phallic complex similar to an *Ornebius* species with shorter pronotum from the same area. This is described as *O. consternus* (see above).

## KEY TO SE ASIAN SPECIES (MALES ONLY)

*Notes.* Species from Taiwan are not included in the key. They are well described and illustrated in Yang & Yen (2001a).

According to the original publication of Fernando (1957), *Ectatoderus sandrasagarai* Fernando, 1957 is of very small size, has a wide frontal rostrum, and the maxillary palps have the fifth segment short and strongly widened; these characters agree with *Micronebius*. It is thus treated here as *Micronebius sandrasagarai* (Fernando, 1957) comb. n.

- 1 Frontal rostrum about twice as wide as scapus. Maxillary palps with apical three segments long and narrow. Paraproct process narrow, almost straight. Sri Lanka. [According to the generic descriptions in Chopard (1969) this is probably a *Derectaotus* as it has a wide frontal rostrum] ..... *E. ceylonicus* Chopard, 1928
- Frontal rostrum about as wide as scapus or little wider ..... 2
- 2 Pronotum very little widening apicad, almost parallel-sided; apical margin truncate ..... *E. apterus* Chopard, 1925
- Pronotum moderately or strongly widening apicad; apical margin rounded (Figs 46-47). Maxillary palps with apical three segments long but not very narrow; apical segment moderately but distinctly widened ..... 3
- 3 Pronotum moderately narrowed in front (Fig. 46) ..... 4
- Pronotum strongly narrowed in front (Fig. 47) ..... 5
- 4 Smaller species: pronotum 2.8 mm, hind femur 3 mm. Komodo ..... *E. marginatus* Bei-Bienko, 1966



- Larger species: pronotum 4.9 mm, hind femur 6.2 mm. South Thailand (Koh Samui) . . . . . *E. samui* sp. n.
- 5 Head and pronotum reddish brown with silky white pubescence; frons reddish brown; abdomen black above. Supra-anal plate transverse with posterior margin feebly notched. Paraprocts without process . . . . . *E. angusticollis* Chopard, 1969
- Head, pronotum and abdomen shining ochre, frons black. Supra-anal plate transverse with posterior margin rounded (Fig. 220). Paraprocts with obtuse erected process (Fig. 219) . . . . . *E. argentatus* sp. n.

*Ectatoderus argentatus* sp. n.

Figs 47, 209, 219-220, 226-230, 360-362, 367-368, 375-376

*Holotype* (♂): Thailand: Nakhon Ratchasima, Khao Yai, Nam Tok Pakluai Mai [Orchid waterfall], 650 m, 14° 20' N, 101° 35' E, 6.-8.iv.1995, leg. S. Ingrisch (ZFMK).

*Paratypes*: 3 ♂, same data as holotype but ex larvae (1 CI, 1 MHNG, 1 EMBT).

*Measurements* (4 ♂). Body 8.2-9.7; pronotum 4.7-5.4; pronotum width 2.9-3.4; tegmen 3.6-4.3; hind femur 4.9-6.2; hind tibia 4.2-4.8; tegmen width 2.8-3.2; hind metatarsus 1.2-1.4 mm. – Ratio pronotum length to width 1.48-1.83; ratio hind tibia to metatarsus 3.45-3.99; ratio tegmen length to width 1.29-1.42.

*Description*. Frontal rostrum slightly wider than scapus; with a faint medial suture. Maxillary palps with apical segment slightly widened; fourth segment shorter than third and fifth segments (Fig. 209). Pronotum ♂ with anterior dorsal margin subtruncate; lateral margins widening posteriorly; posterior margin convex, covering mirror but leaving apex of tegmen free (Fig. 47). Posterior margin of tegmen convex. Anterior tibia with small internal tympanum. Hind femur 1.1-1.3x longer than hind tibia; hind tibia 3.5-4.0x longer than metatarsus.

♂ abdomen. Tenth abdominal tergite fused with epiproct; resulting supra-anal plate short, wider than long; apex rounded (Fig. 220). Paraproct process long and narrow, cylindrical, black (Fig. 219). Subgenital plate triangular; apex broadly rounded and upcurved. Phallic complex with lateral valves weakly sclerotised; forming together a wide tube with a central elevation; medial valve elongate (Figs 226-230).

♀ unknown.

*Colouration*. Ochre (reddish brown when scales are removed). Head with vertex dark reddish brown with yellowish white scales; frons black; antenna yellowish brown with spaced annulation; maxillary palps yellowish brown. Pronotum reddish brown with yellowish white scales. Tegmen whitish or yellowish transparent, at apex with a broad blackish brown band; lateral area black above, white below. Legs yellow with brown marmoration; anterior margin of fore and mid tibia with black scales; apical two segments of tarsus black. Abdomen ♂ reddish brown; with silver or golden scales. Subgenital plate black. Cerci yellow.

*Discussion*. The new species is similar to *E. angusticollis* Chopard, 1969 from Singapore. Both have the male pronotum strongly narrowing in front. The latter species however is described as having the paraprocts without process. Further differences between both species concern the colour pattern and the shape of the supra-anal plate. The phallic complex is also characteristic for the new species. It resembles the situation

in *E. annulipedus* (Shiraki, 1911) and *E. leuctisonus* Yang & Yen, 2001 in that sclerotisation is largely restricted to the medial valve. The medial valve has almost hyaline lateral projections in basal area. The shape of these structures differ between the three species. The differences to other species are outlined in the key.

*Etymology.* Named after the silver brown shining scales covering the body.

*Stridulation.* The calling song consists of chirps that may be repeated as single chirps at irregular intervals or compiled to short chirp sequences. Recordings were taken from two specimens. The first male, collected as an adult and with only two short recordings available, had a tendency to produce single or paired chirps at irregular intervals, but once it produced a sequence of chirps (Figs 360-361). The second male, collected as a nymph and bred to adult, always produced short sequences of chirps (Fig. 362). The chirps consisted of two pulses (Figs 367-368). Chirp duration in sequences was 55-59 ms at 23°C ( $57 \pm 1.2$ ,  $n=15$ ), 58-66 ms at 20°C ( $62 \pm 2.8$ ,  $n=23$ ), and 68-72 ms at 18°C ( $70 \pm 1.1$ ,  $n=16$ ). The corresponding pauses between two succeeding chirps were 301-354 ms at 23°C ( $334 \pm 12.8$ ), 372-405 ms at 20°C ( $387 \pm 12.0$ ), and 442-479 ms at 18°C ( $463 \pm 12.4$ ). The chirp sequences comprised between two and 24 chirps. The pause between two succeeding chirp sequences in the second male varied between 5 and 12 s. The duration of single chirps of the first male was 46-54 ms at 21°C ( $52 \pm 2.4$ ,  $n=13$ ). They were thus little shorter than in the chirp sequence of the same male at 23°C. Frequency maximum was 6.0-6.5 kHz with the first male, but 5.0-5.5 kHz with the second (Figs 375-376).

*Ectatoderus samui* sp. n.

Figs 46, 210, 217-218, 224-225

*Holotype* (♂): Thailand: Nakhon Si Thammarat, Koh Samui, Hin Lad Falls, 9° 31' N, 98° 58' E, 26.-27.ix.1989, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♂). Body 9.3; pronotum 4.9; pronotum width 3.0; tegmen 3.2; hind femur 6.2; hind tibia 5.2; tegmen width 2.8; hind metatarsus 1.3 mm. – Ratio pronotum length to width 1.66; ratio hind tibia to metatarsus 3.92; ratio tegmen length to width 1.14.

*Description.* Frontal rostrum slightly wider than scapus, without medial furrow; vertex with two pits just behind furrow that separates frontal rostrum from vertex. Maxillary palps with apical segment slightly widened; fourth segment little shorter than third and fifth segments (Fig. 210). Pronotum ♂ with anterior margin subtruncate; lateral margins slightly widening posteriorly; posterior margin convex, covering mirror but leaving apex of tegmen free (Fig. 46). Hind femur 1.2x longer than hind tibia; hind tibia 3.9x longer than metatarsus.

♂ abdomen. Tenth abdominal tergite fused with epiproct; resulting supra-anal plate short, wider than long; apical margin obtuse-angular (Fig. 217). Paraproct process short, curved, dark brown, densely covered with short hairs (Fig. 218). Subgenital plate triangular with margins upcurved. Male phallic complex with medial valve curved to a spiral; its base forming an axis in centre (Figs 224-225).

*Colouration.* Dark brown and black. Head dark brown; frons brown with black ornaments; antenna yellowish brown with indistinct spaced annulation; maxillary palps yellowish brown with indistinct darker ornaments. Pronotum dark brown; apical margin with yellowish white scales. Tegmen whitish transparent, at apex with a black

band; lateral area black above, white below. Legs light brown with white and brown scales; anterior margin of fore and mid tibia with black scales. Abdomen ♂ black, apex of segments with whitish brown scales. Subgenital plate with base brown, apex black. Cerci yellowish brown.

**Discussion.** Differences to other species are lined out in the key. The shape of the pronotum of the new species resembles *Ectatoderus marginatus* Bei-Bienko, 1966 from Komodo. It is however much larger than the latter species. Characteristic for the new species is the male phallic complex with the medial valve curved to a spiral in basal part with its base forming an axis in the centre of the spiral. A similar structure of the male genitals was so far known from *Ornebius formosanus* (Shiraki, 1911) from Taiwan (see Yang & Yen, 2001a) and from *Arachnocephalus steini* Saussure, 1877 from Luzon, Philippines (images in DORSA, 2005). If the structure of the male phallic complex ever proves to be in conformance with the phylogenetic relationships of the species, the genera *Ectatoderus*, *Ornebius* and *Arachnocephalus* require new outlines.

**Etymology.** Named after the type locality; noun in apposition.

### *Gotwendia* Bolívar, 1927

*Gotwendia* Bolívar, 1927: 247; Otte *et al.*, 2005.

Type species: *Gotwendia dispar* Bolívar, 1927, by original designation.

**Diagnosis.** Frontal rostrum much wider than scapus. Pronotum ♂ not prolonged behind, leaving most of the tegmen free (Fig. 45). Females apterous.

Abdomen ♂ with tenth tergite and epiproct fused (Fig. 216). Paraprocts simple, without projection. Phallic complex membranous without sclerites (Fig. 223; only known for *G. erawan*).

**Discussion.** The genus was previously known to contain two species, *G. dispar* Bolívar, 1927 from Iran and *G. albipennis* Chopard, 1969 from Pakistan.

### KEY TO SPECIES (MALES ONLY)

- 1 Tegmen shorter than pronotum; white. Hind tibiae widening towards apex . . . 2
- Tegmen longer than pronotum; pale yellow with a black band at apex (Fig. 45). Hind tibiae not widening towards apex. Thailand (Kanchanaburi) . . . . . *G. erawan* sp. n.
- 2 Smaller (pronotum 2, tegmen 1.4, hind femur 3.8 mm, from Bolívar, 1927). Pronotum almost parallel-sided. Iran (Zagros Mts) . . . . . *G. dispar* Bolívar, 1927
- Larger (pronotum 3.1, tegmen 1.5, hind femur 4.2 mm, from Chopard, 1969). Pronotum narrowing little more in front. Pakistan (Karachi) . . . . . *G. albipennis* Chopard, 1969

### *Gotwendia erawan* sp. n.

Figs 41, 45, 211, 216, 223

**Holotype** (♂): Thailand: Kanchanaburi, Nam Tok Erawan, 14° 20' N, 99° 8' E, 9.iv.1994, leg. S. Ingrisch (ZFMK).

**Paratype:** 1 ♂, same data as holotype (CI).

**Measurements** (2 ♂). Body 8.4-8.8; pronotum 2.5-2.7; pronotum width 2.6-2.7; tegmen 3.15; tegmen width 2.9-3.0; hind femur 5.3-5.6; hind tibia 3.8; hind metatarsus

1.4-1.6 mm. – Ratio pronotum length to width 0.91-1.00; ratio hind tibia to metatarsus 2.43-2.72; ratio tegmen length to width 1.04-1.06.

*Description.* Frontal rostrum about two times broader than scapus; without medial furrow. Maxillary palps with apical segment little widened, as long as fourth segment; fourth and fifth segments longer than third segment (Fig. 211). Pronotum ♂ with anterior dorsal margin concave; lateral margins hardly narrowed in front; posterior margin subtruncate, covering tegmen to stridulatory vein (Fig. 45). ♂ tegmen broader than pronotum; posterior margin convex; mirror oval, wider than long (Fig. 41). Anterior tibia with internal tympanum. Hind femur 1.4-1.5x longer than hind tibia; hind tibia 2.4-2.7x longer than metatarsus.

♂ abdomen. Tenth abdominal tergite completely fused with epiproct; resulting supra-anal plate with a pair of irregular carinae from base to apex; curved lateral appendages (of tenth tergite) arising from this carina; apex convex and setose (Fig. 216). Paraprocts simple. Subgenital plate wider than long; apical margin rounded, truncate in middle. Ectophallus valves membranous with indistinct sclerotisation (Fig. 223).

*Colouration.* Black with yellow wings. Head dark reddish brown; frons medium reddish brown; clypeus yellow; antenna unicoloured; dark reddish brown; maxillary palps dark brown. Pronotum dark reddish brown with black scales. Tegmen pale yellow, at apex with a broad blackish brown band; lateral area same as disc. Legs medium brown with dark brown scales. Abdomen ♂ dark brown with black scales; ventral surface with brown scales. Subgenital plate black. Cerci medium brown, yellow at very base and apex.

*Discussion.* The new species agrees with the generic characters of *Gotwendia* as wide frontal rostrum, shape of maxillary palps, tibial tympana, and the short pronotum. It differs from both other species by longer wings and the hind tibiae not widened towards apex. From *G. dispar* it also differs by the pronotum with the lateral margins moderately narrowing in front instead of almost parallel-sided except near the very fore margin.

*Etymology.* Named after the type locality; noun in apposition.

### *Micrornebius* Chopard, 1969

*Micrornebius* Chopard, 1969: 203; Otte *et al.*, 2005.

*Type species:* *Micrornebius gracilicornis* Chopard, 1969 by original designation

*Diagnosis.* Small (body 4.3-7.5 mm, hind femur 2.3-3.7 mm) Mogoplistinae crickets (Figs 48-61). Maxillary palps with short segments and apical segment considerably widened (Figs 231-261 partim). Pronotum ♂ prolonged, covering tegmen completely. Females apterous. Anterior tibia with internal tympanum. Hind tibia 1.8-2.6x longer than metatarsus (Fig. 82). Tenth abdominal tergite in both sexes fused with epiproct to form a supra-anal plate (Figs 232-262 partim). ♂ supra-anal plate usually truncate. Paraprocts without or with only short projections (Figs 233-259 partim). Phallic complex sclerotised to a variable degree (Figs 263-285). ♀ supra-anal plate truncate, rounded, or triangularly rounded. Ovipositor apical valves always provided with short and long hairs (Figs 286-292).



**Discussion.** Seven species were so far combined with *Micronebius*: *M. gracilicornis* Chopard, 1969 from Java, Depok, *M. annandalei* (Chopard, 1928) from India, Orissa, Barkuda Island, *M. lesnei* (Chopard, 1935) from Mozambique, Nova Choupanga, *M. aquilus* Gorochoy, 1992 from Vietnam, *M. spadiceus* Gorochoy, 1994 from Vietnam, *M. perrarus* Yang & Yen, 2001 from Taiwan, and *M. hainanensis* Yin, 1998 from China, Hainan. Three more species are transferred to *Micronebius* in this paper: *Micronebius brevipalpis* (Chopard, 1930) comb. n. from *Ornebius* described from a single female from Sarawak, Mt. Poi, that agrees in all respects with the generic diagnosis of *Micronebius* as short maxillary palps with widened apical segment and the ovipositor apical valves provided with few long hairs, *Micronebius sandrasagarai* (Fernando, 1957) comb. n. (see above under *Ectatoderus*), and *Micronebius incertus* (Ingrisch, 1998) comb. n. from *Derectaotus* (see discussion under the species). A further species, *Ectatoderus pallidegeniculatus* Brunner, 1893, from Bhamo, Myanmar, probably also belongs to *Micronebius*; however the description also allows a combination with *Cycloptiloides*. Unfortunately, Brunner (1893) did not describe the shape of the maxillary palps nor the apical valves of the ovipositor. Thus the generic affinity remains doubtful.

To the genus *Micronebius* belong some of the smallest crickets found in Mogoplistinae. The overall similarity between species is high although the colour pattern may prove helpful for diagnosis if the scales are well preserved (see Gorochoy, 1992, Yang & Yen, 2001b). But this is often not the case with specimens kept in alcohol. The material at hand contains six new species that differ strikingly by the male phallus which possesses minute sclerites. This is probably the best diagnostic character as with other crickets. The male phallus was previously only described by Yang & Yen (2001a) for *M. perrarus*. The new taxa come from Sabah (1 species), Singapore (1 species), West Sumatra (1 species), and Thailand (3 species).

No key to species is given as it is expected that several new local species may be discovered in the future, and because most of the previous descriptions do not allow to differentiate between species. The species described here can be readily recognised by the specific male phallus.

***Micronebius cylindricus* sp. n.** Figs 55-56, 77, 246-249, 277-278, 288

**Holotype** (♂): Singapore: Botanical garden, in the Jungle area, 25 m, 16 December 1987, leg. Charles Lienhard (MHNG).

**Paratypes:** 1 ♂, 1 ♀, same data as holotype (MHNG).

**Measurements** (2 ♂, 1 ♀). Body ♂ 4.4-5.0, ♀ 5.6; pronotum ♂ 2.5-2.7, ♀ 1.3; pronotum width ♂ 1.6, ♀ 1.3; tegmen ♂ 2.1; tegmen width ♂ 1.8; hind femur ♂ 2.5-2.6; ♀ 2.5; hind tibia ♂ 1.6-1.7, ♀ 1.6; hind metatarsus ♂ 0.9-1.0, ♀ 0.9; ovipositor ♀ 1.6 mm. – Ratio pronotum length to width ♂ 1.54-1.62, ♀ 1.0; ratio hind tibia to metatarsus ♂ 1.79-1.8; ♀ 1.8; ratio tegmen length to width ♂ 1.18.

**Description.** Frontal rostrum about two times broader than scapus, indistinctly furrowed in midline. Maxillary palps with apical segment strongly widened; fourth segment slightly widened and shorter than apical or third segment (Fig. 246). Pronotum ♂ with anterior dorsal margin feebly concave; lateral margins slightly widening posteriorly; posterior margin feebly convex, covering tegmen completely (Fig. 55).

Pronotum ♀ as long as wide; scarcely narrowing in front; anterior margin slightly concave; posterior margin straight (Fig. 56). Hind femur 1.5-1.6x longer than hind tibia; hind tibia 1.8x longer than metatarsus.

♂ abdomen. Supra-anal plate apical margin with central area projecting and truncate, on both sides concave and with a short projection, with long hairs at both apical angles (Fig. 247). Paraprocts with a short, obtuse projection (Fig. 248). Subgenital plate apical margin rounded and upcurved. Phallus forming a membranous cylinder, narrowing towards apex and with a circular hole at apex through which the medial valves are little projecting; medial valves elongate, mostly membranous and not very distinct except at base and apex (Figs 277-278).

♀ abdomen. Ninth abdominal tergite with apex feebly convex. Supra-anal plate rounded (Fig. 249). Paraprocts with a low setose carina at base. Subgenital plate rhomboid, apex truncate. Ovipositor short, slightly curved; apical valves with margins smooth, narrow, with long hairs at apex (Fig. 288).

Colouration. Dark brown. Head with frons dark brown; antenna with scapus and pedicellus dark brown, flagellum medium brown; maxillary palps dark brown with apex of each joint white. Pronotum dark brown. Tegmen transparent; lateral area faintly infumate. Fore and mid femora dark brown with white apex; fore and mid tibiae with light and dark rings; hind femur light brown covered with dark brown scales to a variable extent. Abdomen ♂ dark brown above, light brown below. Cerci dark brown. Abdomen ♀ as in ♂. Subgenital plate light. Cerci dark brown. Ovipositor yellowish brown.

*Discussion.* The new species is characterised in the male by the membranous, cylindrical phallus which embraces the medial valves completely. This differs from the situation in all other *Micronebius* species for which the phallic complex is known so far.

*Etymology.* The name refers to the characteristic shape of the male phallic complex.

*Micronebius gracilicornis* Chopard, 1969 Figs 50-51, 231-234, 270-272, 287

*Micronebius gracilicornis* Chopard, 1969: 204. Holotype (♂): Indonesia: West Java, Depok (MNHN; not seen).

*Material studied.* Indonesia: 1 ♂, 1 ♀, West Java, Palabuan Ratu, Samudra beach, relic forest, 6° 58' S, 106° 30' E, 12.ii.1995, leg. S. Ingrisch (CI).

*Measurements* (1 ♂, 1 ♀). Body ♂ 4.7, ♀ 4.9; pronotum ♂ 3.2, ♀ 1.5; pronotum width ♂ 1.8, ♀ 1.6; tegmen ♂ 1.9; hind femur ♂ 3.1, ♀ 3.2; hind tibia ♂ 2.0, ♀ 2.0; hind metatarsus ♂ 0.9, ♀ 1.0; ovipositor ♀ 2.0 mm. — Ratio pronotum length to width ♂ 1.75, ♀ 0.92; ratio hind tibia to metatarsus ♂ 2.22, ♀ 1.93.

*Additional description.* ♂ abdomen. Supra-anal plate wider than long; shallowly grooved; apex subtruncate, setose (Fig. 232). Paraprocts with a short, obtuse projection (Fig. 233). Phallic complex with lateral valves membranous but stiffened and with distinct structure as in Fig. 270; internal sclerites as in Figs 270-272. Subgenital plate with apical margin truncate and slightly upcurved.

♀ abdomen. Supra-anal plate strongly narrowed at apex, obtuse; epiproct triangular with apex rounded (Fig. 234). Subgenital plate triangular in general outline; apex

broad, slightly concave. Ovipositor with apical valves narrow, with few long hairs at apex (Fig. 287).

*Discussion.* The type of *M. gracilicornis* was collected in Depok (West Java) which is now urban area. The specimens at hand are also from West Java but from the south coast. They agree with the description given by Chopard (1969). The phallic complex is described here for the first time.

*Micronebius incertus* (Ingrisch, 1998) **comb. n.** Figs 48-49, 78-79, 238-240, 263-266, 291

*Derectaotus incertus* Ingrisch, 1998: 232; Otte *et al.*, 2005. Holotype (♂): East Malaysia, Sabah, Mt. Kinabalu NP, Poring, 500-700 m, 6° 5' N, 116° 33' E, 4.ii.1994, leg. A. Floren (ZFMK).

*New material:* 5 ♂, 12 ♀, Sabah, Sorinsim, canopy fogging, 16.ii.-12.iii.1997, leg. A. Floren (3 ♂, 8 ♀, ZFMK, 1 ♂, 1 ♀ MHNG, 1 ♂, 3 ♀, CI).

*Measurements* of specimens from Sorinsim (6 ♂, 13 ♀). Body ♂ 4.4-5.3, ♀ 4.4-5.9; pronotum ♂ 2.4-2.6, ♀ 1.2-1.4; pronotum width ♂ 1.4-1.6, ♀ 1.1-1.4; tegmen ♂ 1.4-1.8, ♀ 0; hind femur ♂ 2.3-2.7, ♀ 2.4-2.8; hind tibia ♂ 1.6-1.8, ♀ 1.6-1.8; hind metatarsus ♂ 0.7-0.9, ♀ 0.8; ovipositor ♀ 1.4-1.6 mm; ratio pronotum length to width ♂ 1.58-1.73, ♀ 0.98-1.12, 1±0; ratio hind tibia to metatarsus ♂ 2.0-2.16, ♀ 2.0-2.32.

*Additional description.* Frontal rostrum about two times broader than scapus, indistinctly furrowed in midline. Maxillary palps with apical segment widened and of about same length with third segment; fourth segment slightly widened and shorter than apical or third segment (Fig. 239). Pronotum ♂ with lateral margins widening posteriorly (Fig. 48). Pronotum ♀ as long as wide or little longer; slightly widening posteriorly; anterior and posterior margins straight (Fig. 49). Hind femur 1.4-1.6 x longer than hind tibia; hind tibia 2.0-2.3 x longer than hind metatarsus.

♂ abdomen. Supra-anal plate rhombic; apico-lateral area little projecting (Fig. 238). Paraprocts with a short, obtuse, transverse projection; paraproct process strongly setose (Fig. 238). Subgenital plate with apical margin rounded. Phallic complex with medial valve with a distinct minute sclerite forming three longitudinal branches connected in baso-dorsal area by a V-shaped bar (Figs 263-266).

♀ abdomen. Supra-anal plate with apex rounded, setose (Fig. 240). Subgenital plate parallel-sided at base, triangular afterwards; apex truncate. Ovipositor short, straight; apical valves with margins smooth, with few long bristles (Figs 79, 291).

*Colouration.* Medium to dark brown; maxillary palps brown; very base and apex of each joint white. Tegmen transparent. Legs brown, apices of articles white. Cerci white, apical half blackish brown, very apex white (Fig. 79). Abdomen ♀ with fifth to ninth or all tergites dark brown. Cerci white, apical third dark brown, tip white. Ovipositor yellowish brown.

*Discussion.* The species was originally described from three males (holotype and two paratypes) and one female that was not included in the type series because of uncertainty that it really belongs to the same species. After more specimens were available it became clear that this female really belongs to another species. Moreover regarding the generic outlines as used in the present paper, the males should be transferred to *Micronebius*, while the female belongs to *Cycloptiloides*.

In the above description of *M. incertus*, the descriptions of the female and of the male phallic complex are new adds. The male of *M. incertus* is well characterised by its phallic complex. The distinct colouration of the cerci is also a diagnostic character for both sexes. The female is similar to *Micronebius brevipalpis* (Chopard, 1930) described from a single female. The females of *Micronebius* are all very similar and it is difficult to find any reliable differences. The female of *M. incertus* differs from *M. brevipalpis* by the pronotum with the lateral margins more strongly diverging towards apex, the palps with base and apex of each joint white (not only the base), and by the subgenital plate with parallel-sided base.

***Micronebius inopinatus* sp. n.** Figs 54, 235-237, 273-275, 363, 369-370, 378

*Holotype* (♂): Thailand: Chiang Mai, city district, with fruit from local market, 18° 47' N, 99° 0' E, 17.ix.1993, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♂). Body 4.5; pronotum 2.8; pronotum width 2.0; tegmen 2.0; hind femur 3.0; hind tibia 1.8; hind metatarsus 0.9 mm. – Ratio pronotum length to width 1.46; ratio hind tibia to metatarsus 2.01.

*Description*. Frontal rostrum about two times broader than scapus, without medial furrow. Maxillary palps with apical segment strongly widened and little longer than third and fourth segments (Fig. 235). Pronotum ♂ with anterior dorsal margin concave; lateral margins slightly widening posteriorly; posterior margin convex, covering tegmen completely (Fig. 54). Hind femur 1.4x longer than hind tibia; hind tibia 2.4x longer than metatarsus.

♂ abdomen. Supra-anal plate short and wide; apex faintly convex, setose (Fig. 236). Paraprocts with a curved, horizontal, blackened swelling (Fig. 237). Subgenital plate wider than long, apical margin rounded and upcurved. Phallic complex with small sclerite, probably at base of medial valve (Figs 273-275).

♀ unknown.

Colouration. Brown. Head with vertex dark reddish brown; frons, genae and mouthparts black; antenna with scapus and pedicellus dark brown above, black below, flagellum light brown; maxillary palps blackish brown. Pronotum dark reddish brown, lateral lobes with black ventral margin. Tegmen whitish transparent, at apex with a broad black band; lateral area black above, white below. Legs yellowish white with dark marmoration; apical two segments of tarsus black. Abdomen ♂ mostly black on dorsal, dark brown on ventral side. Cerci with brownish white scales.

*Discussion*. The new species is similar to *M. insularis* and *M. laem*, differs however by the male phallic complex. Moreover it differs from other *Micronebius* species by the supra-anal plate which is widely rounded instead of truncate or faintly concave.

*Etymology*. The name reflects the surprise to hear cricket sound out of local fruit; derived from *inopinatus* (Lat.) = surprised.

*Stridulation*. The calling song is a regular continuous repetition of short trills (Fig. 363). At 25°C, four trills were repeated within ten seconds. Trill duration varied between 1030 and 1170 ms. Each trill contained 60-67 pulses (Fig. 370). Usually between one and three short interruptions (missing pulses) occurred in each trill. Frequency maximum was at 7.4-7.8 kHz (Fig. 378).



*Micronebius insularis* sp. n.

Figs 59-60, 250-253, 279-281, 289

*Holotype* (♂): Thailand: Nakhon Si Thammarat, Koh Samui, Hin Lad Falls, 9° 31' N, 98° 58' E, 26.-27.ix.1989, leg. S. Ingrisch (ZFMK).

*Paratypes*: 1 ♂, 1 ♀, same data as holotype (1 ♂, CI; 1 ♀, ZFMK); 1 ♀, Surat Thani, Koh Ang Thong, 9° 37' N, 99° 40' E, 9.x.1985, leg. S. Ingrisch (CI).

*Measurements* (2 ♂, 2 ♀). Body ♂ 4.5-5.1, ♀ 4.3-4.7; pronotum ♂ 2.7-2.8; ♀ 1.3-1.6; pronotum width ♂ 1.7-1.8; ♀ 1.4-1.7; tegmen ♂ 2.8-2.9; hind femur ♂ 3.2, ♀ 2.9-3.3; hind tibia ♂ 2.2, ♀ 2.0-2.3; hind metatarsus ♂ 0.9, ♀ 0.9; ovipositor ♀ 1.6-1.8 mm. – Ratio pronotum length to width ♂ 1.51-1.54; ♀ 0.91-1.0; ratio hind tibia to metatarsus ♂ 2.51; ♀ 2.3-2.58.

*Description*. Frontal rostrum about two times broader than scapus; without medial furrow. Maxillary palps with apical segment strongly widened; fourth segment shorter than third and fifth segments (Fig. 250). Pronotum ♂ with anterior dorsal margin feebly concave; lateral margins slightly widening posteriorly; posterior margin convex, covering tegmen completely (Fig. 59). Pronotum ♀ as wide as long; slightly narrowing in front; anterior margin feebly concave, posterior margin feebly convex (Fig. 60). Hind femur 1.4-1.5x longer than hind tibia; hind tibia 2.3-2.6x longer than metatarsus.

♂ abdomen. Supra-anal plate wider than long, apex feebly concave; shallowly grooved in middle (Fig. 251). Paraprocts simple (Fig. 252). Subgenital plate apical margin rounded and upcurved. Epiphallus with a small, triangular, denticulate sclerite (Fig. 281); lateral valves of phallus hyaline, membranous; internal sclerites compressed, elongate, with curved apex (Figs 279-280).

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate triangular with apex broadly rounded, furrowed in middle (Fig. 253). Paraprocts with a vertical swelling but not forming a carina. Subgenital plate triangular with sloping lateral margins, apex truncate. Ovipositor of medium length; apical valves narrow, with few long hairs at apex (Fig. 289).

*Colouration*. Dark brown. Head with frons dark brown; antenna with scapus and pedicellus dark brown, flagellum medium brown with spaced annulation; maxillary palps dark brown. Pronotum dark reddish brown, lateral lobes black. Tegmen white; lateral area dark brown with margin and one vein white. Legs yellowish white with medium and dark brown scales; tibiae with alternating light and dark bands. Abdomen ♂ blackish brown above, brown below. Cerci with mixed light and dark brown scales; base and a preapical ring white, apex black. Abdomen and cerci female as in male. Subgenital plate brown with silver scales. Ovipositor yellowish brown, apical valves reddish brown.

*Discussion*. The new species can be recognised by the strong and rather long internal sclerites of phallus and the large membranous lateral valves; moreover the epiphallus carries a small triangular sclerite on the underside.

*Etymology*. Named after the type locality; *insularis* = living on islands.

*Micronebius laem* sp. n.

Figs 58, 254-256, 276

*Holotype* (♂): Thailand: Kanchanaburi, Thong Pha Phum to Khao Laem Dam, near northern border of village Thong Pha Phum, 14° 45' N, 98° 39' E, 15.vi.1986, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♂). Body 4.3; pronotum 2.9; pronotum width 1.6; tegmen 3.1; hind femur 2.8; hind tibia 1.9; hind metatarsus 0.9 mm. – Ratio pronotum length to width 1.8; ratio hind tibia to metatarsus 2.15.

*Description.* Frontal rostrum about two times broader than scapus, with a faint medial suture. Maxillary palps with apical segment distinctly widened; fourth segment slightly widened and shorter than apical or third segments (Fig. 254). Pronotum ♂ with anterior dorsal margin feebly concave; lateral margins slightly widening posteriorly; posterior margin convex, covering tegmen completely (Fig. 58). Hind femur 1.5x longer than hind tibia; hind tibia 2.1x longer than metatarsus; hind femur with few long bristles.

♂ abdomen. Supra-anal plate wide, rectangular, finely furrowed in middle, apex broadly truncate (Fig. 255). Paraprocts with a weak, horizontal carina (Fig. 256). Subgenital plate with apical margin broadly concave and setose. Lateral valves of phallus with a short sclerite near apex; medial valve with a single, rather strong sclerite; curved at base (Fig. 276).

♀ unknown.

*Colouration.* Medium brown. Head with frons medium brown; antenna with scapus and pedicellus brown; flagellum yellowish brown, darkened towards apex; maxillary palps dark brown. Pronotum medium brown, lateral lobes with black ventral margin. Tegmen whitish transparent with white veins, apex little infumate; lateral area same as disc. Legs yellowish white with medium and dark brown scales; tibiae with black scales and three white bands; metatarsi black, apex white; hind metatarsus also white at base. Abdomen ♂ dark brown above, light brown below. Cerci yellow with silver and dark brown scales and black apex.

*Discussion.* The new species is very similar to *M. insularis*, differs however strikingly by the male phallic complex.

*Etymology.* Named after the type locality; noun in apposition.

***Micronebius lineatus* sp. n.**

Figs 57, 80, 257-260, 267-269, 292

*Holotype* (♂): East Malaysia, Sabah, Crocker Range I, canopy fogging, 5° 26' N, 116° 8' E, 19.ii.2001, leg. A. Floren (ZFMK).

*Paratypes:* 2 ♂, 1 ♀, same data as holotype; 1 ♀, Crocker Range III, near village Ulu Liawan, canopy fogging, 5° 24' N, 116° 5' E, 20.ii.2001, leg. A. Floren (1 ♂, 1 ♀, ZFMK; 1 ♂, 1 ♀, CI).

*Measurements* (3 ♂, 2 ♀). Body ♂ 4.7-5.1, ♀ 5.0-5.2; pronotum ♂ 3.1-3.3, ♀ 1.4; pronotum width ♂ 1.8-2.0, ♀ 1.4; tegmen ♂ 1.9-2.0; ovipositor ♀ 1.6 mm; ratio pronotum length to width ♂ 1.7, ♀ 1.0. [Hind legs missing in specimens at hand].

*Description.* Frontal rostrum about two times broader than scapus; indistinctly furrowed in midline. Maxillary palps with apical segment widened and of about same length with third segment; fourth segment slightly widened and shorter than apical or third segments (Fig. 257). Pronotum ♂ with lateral margins widening posteriorly, posterior margin prolonged; covering tegmen completely (Fig. 57). Pronotum ♀ as wide as long; slightly widening posteriorly; anterior and posterior margins straight.

♂ abdomen. Supra-anal plate rhombic; apex setose (Fig. 258). Paraprocts with a short, obtuse, strongly setose, transverse projection (Fig. 259). Subgenital plate with

apical margin rounded. Phallic complex with two large, angular, brown, apical plates (Fig. 269); below those plates with two smaller discs which are largely hyaline except for external margin and two knob-like structures. Medial valves hyaline except for a minute sclerite at base (Figs 267-268).

♀ abdomen. Supra-anal plate with apex rounded; shallowly grooved in middle; setose (Fig. 260). Subgenital plate rather long with sloping lateral margins; apex truncate. Ovipositor short, straight; apical valves with margins smooth; with few long bristles (Fig. 292).

Colouration. Medium to dark brown. Head dark brown; frons blackish brown; antenna with scapus and pedicellus dark brown; flagellum light with spaced dark annulation; maxillary palps blackish brown with very base and apex of each joint white, apical segment fully dark. Pronotum dark brown. Tegmen whitish transparent, apex infumate; lateral area white with 2 longitudinal brown bands (Fig. 80). Fore leg dark brown, apex of femur, base and apex of tibia and apex of metatarsus white [other legs missing]. Abdomen ♂ dark brown; apical margin of segments white; cerci brown at base, lighter towards apex. Abdomen ♀ as in ♂. Supra-anal plate dark brown (scales removed). Subgenital plate dark brown. Ovipositor yellowish brown.

*Discussion.* *M. lineatus* is similar to *M. incertus*. The male phallic complex is however completely different. Another diagnostic character is the colour of the cerci which are brown, not white at base. Less obvious differences are the slightly larger size, a bigger head, longer lateral area of tegmen with the brown bands more expressed, and a little longer ovipositor.

*Etymology.* Named for the two brown bands on the lateral area of male tegmen.

***Micrornebius maninjau* sp. n.** Figs 52-53, 82, 241-245, 282-286, 364, 371, 377

*Holotype* (♂): Indonesia: West Sumatra, Maninjau, 500-700 m, 0° 18' S, 100° 15' E, in hollow plant stem, 15.iii.1995, leg. S. Ingrisch (ZFMK).

*Paratypes*: 1 ♀, same locality as holotype, 14.iii.1995 (ZFMK); 1 ♀, Maninjau - Puncak Lawang, 600-950 m, 0° 17' S, 100° 15' E, 15-17.iii.1995, leg. S. Ingrisch (CI); 1 ♂, Lake Maninjau, border of lake at southern limits of village Maninjau, 380 m, 25.xi.1985, leg. Charles Lienhard (MHNG).

*Measurements* (2 ♂, 2 ♀). Body ♂ 6.1-7.4, ♀ 4.5-4.9; pronotum ♂ 3.3-4.0, ♀ 1.6-1.8; pronotum width ♂ 2.1-2.3, ♀ 1.6-1.8; hind femur ♂ 2.8-3.5, ♀ 3.6-3.7; hind tibia ♂ 2.0-2.6, ♀ 2.5; hind metatarsus ♂ 1.0-1.1, ♀ 1.0-1.1; ovipositor ♀ 2.0-2.4 mm. – Ratio pronotum length to width ♂ 1.58-1.75, ♀ 1-1.04; ratio hind tibia to metatarsus ♂ 2.05-2.41, ♀ 2.30-2.65.

*Description.* Frontal rostrum about two times broader than scapus, indistinctly furrowed in midline or without medial furrow. Maxillary palps with apical segment strongly widened; fourth and fifth segments of equal length, hardly shorter than third segment (Fig. 241). Pronotum ♂ with anterior dorsal margin feebly concave; lateral margins widening posteriorly; posterior margin convex, covering tegmen completely (Fig. 52). Pronotum ♀ as long as wide; slightly widening posteriorly; anterior margin substraight; posterior margin feebly convex (Fig. 53). Hind femur 1.3-1.5x longer than hind tibia; hind tibia 2.1-2.7x longer than metatarsus (Fig. 82).

♂ abdomen. Supra-anal plate with lateral margins of central part slightly swollen, apex faintly concave (Fig. 242). Paraprocts with a short, obtuse projection

(Fig 243-244). Subgenital plate with apical margin truncate and slightly upcurved. Epiphallus membranous; medial valves of phallus with little curved, elongate sclerites with widened base (Figs 282-285).

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate rounded, grooved in middle; with long hairs at apical margin (Fig. 245). Paraprocts laterally elevated. Subgenital plate rather long with sloping lateral margins; apex truncate to slightly concave. Ovipositor short; apical valves with margins smooth, narrow, with few long hairs at apex (Fig. 286).

Colouration. Covered with blackish brown scales. Head with frons blackish brown; antenna with scapus and pedicellus blackish brown, flagellum yellow with spaced dark annulation; maxillary palps blackish brown. Pronotum black. Legs black; tibiae with a white band in middle and at apex and a white ring near base. Abdomen ♂ black. Subgenital plate black. Cerci yellow, suffused with black scales except at base. Abdomen ♀ dark to medium brown to black, apex of segments with or without white scales. Subgenital plate brown or black. Cerci as in male. Ovipositor yellowish brown.

*Discussion.* The new species differs from other *Micronebius* species by the rather long pronotum in male, its dark colouration, and especially by the characteristic internal sclerites of phallus. The male holotype was found in a hollow plant stem, the females in forest litter.

A second male from Lake Maninjau [conserved in ethanol but dried out once] is slightly smaller and the pronotum with artificially curved apex shorter. As the phallic complex is identical with that of the holotype there is no doubt that it belongs to the same species.

*Etymology.* Named after the type locality; noun in apposition.

*Stridulation.* The calling song is a continuous trill of pulses with short interruptions at irregular intervals (Fig. 364). Repetition rate at 25°C was 5.4 pulses per seconds (Fig. 371). The frequency maximum is between 4.9 and 5.4 kHz (Fig. 377).

### *Micronebius* sp.

Figs 61, 261-262, 290

Singapore: 1 ♀, Bukit Timah Nature Reserve, Taban Valley, 30-110 m, 6.xi.1985, leg. Bernd Hauser (début du sentier Jalan Jambul) (MHNG).

*Measurements* (1 ♀). Body: 5.6; pronotum: 1.5; pronotum width: 1.5; hind femur: 3.3; hind tibia: 2.5; hind metatarsus: 1.0; ovipositor: 2.1 mm. – Ratio pronotum length to width: 0.96; ratio hind tibia to metatarsus: 2.44.

*Description.* Frontal rostrum about two times broader than scapus, indistinctly furrowed in midline. Maxillary palps with apical segment strongly widened; fourth segment slightly widened and shorter than apical or third segments (Fig. 261). Pronotum ♀ as long as wide, widening posteriorly; anterior and posterior margins straight (Fig. 61). Hind femur 1.4x longer than hind tibia; hind tibia 2.4x longer than metatarsus.

♀ abdomen. Ninth and eighth abdominal tergites slightly projecting in middle. Supra-anal plate rounded (Fig. 262). Paraprocts with a vertical carina carrying long hairs. Subgenital plate rounded. Ovipositor of medium length; apical valves with margins smooth, narrow, with few long hairs at apex (Fig. 290).



Colouration. Dark brown. Head with frons dark brown; antenna with scapus and pedicellus brown, flagellum yellow; maxillary palps dark brown. Pronotum dark brown. Legs yellow, spotted with brown; fore and mid tibia with dark rings. Abdomen ♀ brown. Subgenital plate brown. Ovipositor yellowish brown.

*Discussion.* The single female is similar to *O. cylindricus* which also comes from Singapore. It differs however by a longer ovipositor with the hairs at the apical valves of the ovipositor being less numerous. It probably represents another species, but without corresponding male this is not certain.

### *Cycloptiloides* Sjöstedt, 1909

*Cycloptiloides* Sjöstedt, 1909: 110; Otte *et al.*, 2005.

Type species: *Cycloptiloides meruensis* Sjöstedt, 1909, by monotypy.

*Remark.* Species from Africa, America, and Asia are currently assigned to this genus. From south east Asia, there was so far a single species known, *C. orientalis* Chopard, 1925 with the synonym *C. ceylonicus* Chopard, 1925. *C. niger* Ingrisch, 1978 belongs to the new genus *Terraplistes* (see below).

*Diagnosis* (for SE Asian species only, not necessarily applies to species from other regions). Small (body 4.8–8.1 mm, hind femur 3.2–4.3 mm, in a single species 5.5mm) Mogoplistinae crickets (Figs 62–69). Maxillary palps elongate with apical segment only little widened or hardly widened at all (Figs 301–321 partim). Pronotum ♂ projecting behind, covering tegmen completely. ♀ apterous. Fore tibia with internal tympanum. Hind tibia 2.1–2.4x longer than metatarsus (Fig. 83). Tenth abdominal tergite in both sexes fused with epiproct to form a supra-anal plate (Figs 305–320 partim). ♂ paraprocts with a long process or only short projection (Figs 302, 306, 309, 314). ♂ phallic complex largely membranous with or without minute sclerites of variable shape (Figs 323–330). ♀ paraprocts almost lying on underside of body, prolonged, with a longitudinal, setose carina (Fig. 81). The carinae of both paraprocts together possible serve as guide bars for the ovipositor. Ovipositor apical valves usually narrow, either with three rows of short hairs, with few short and long hairs or (mostly) with few stout but short hairs (Figs 293–297), but sometimes lobiform (Fig. 299).

### KEY TO SE ASIAN SPECIES

#### MALES

- 1 Paraprocts with a long upcurved process (Figs 302, 309) . . . . . 2
- Paraprocts with a short transverse projection (Figs 306, 314) . . . . . 3
- 2 Maxillary palps with apex of last segment strongly oblique (Fig. 301).  
Paraproct process long-cylindrical, curved (Fig. 302). Supra-anal plate  
with two short obtuse projections (Fig. 302). West Sumatra (Bukittinggi)  
. . . . . *C. orientalis* Chopard, 1925<sup>1</sup>
- Maxillary palps with apex of last segment not so strongly oblique (Fig.  
307). Paraproct process conical (Fig. 309). Supra-anal plate with apex

<sup>1</sup> check also *C. ceylonicus* Chopard, 1925, from Sri Lanka which is probably a separate species.

- faintly concave (Fig. 308). Phallic complex with three minute sclerites and two even smaller hooks (Figs 325-328). North Thailand (Chiang Mai) ..... *C. pui* sp. n.
- 3 Paraprocts with a small projection pointing mediad (Fig. 314). Supra-anal plate broadly rounded (Fig. 313). Phallic complex at apex roughly cylindrical with minute indistinct sclerotisation inside (Figs 323-324). Singapore ..... *C. timah* sp. n.
- Paraprocts spoon-shaped with minute, obtuse, curved projection (Fig. 306). Male supra-anal plate triangularly rounded (Fig. 305). Male phallus bilobate with minute indistinct sclerotisation near apex (Figs 329-330). Central Thailand (Nakhon Ratchasima) ..... *C. pakchong* sp. n.

## FEMALES

- 1 Ovipositor apical valves with acute or subacute apex (Figs 293-297) ..... 2
- Ovipositor apical valves lobular (Fig. 299). Thailand (Kanchanaburi) ..... *C. lobicauda* sp. n.
- 2 Ovipositor apical valves in lateral view either with three rows of regular short hairs or with mixed long and short hairs (Figs 293, 297) ..... 3
- Ovipositor apical valves with few short hairs or short strong bristles (Figs 294-296) ..... 4
- 3 Maxillary palps with apex of last segment strongly oblique. Ovipositor apical valves with three rows of short hairs (Fig. 293). West Sumatra (Bukittinggi) ..... *C. orientalis* Chopard, 1925
- Maxillary palps with apex of last segment not so strongly oblique. Supra-anal plate rounded with two bunches of long hairs at apex (Fig. 311). Ovipositor apical valves with few mixed short and long hairs (Fig. 297). North Thailand (Chiang Mai) ..... *C. pui* sp. n.
- 4 Supra-anal plate triangular with apex rather narrowly rounded (Fig. 315). Singapore ..... *C. timah* sp. n.
- Supra-anal plate tongue shaped with apex broadly rounded (Figs 317, 319-320) ..... 5
- 5 Maxillary palps with apical segment 3.0-3.5 x longer than wide (Fig. 318). Supra-anal plate with basal part longer; shallowly furrowed in middle (Figs 319-320). Ovipositor 2.5-2.6 mm (Fig. 295). Sabah ..... *C. sp. 1*
- Maxillary palps with apical segment 4.0-4.5 x longer than wide (Fig. 316). Supra-anal plate with basal part shorter (Fig. 317). Ovipositor 2.8 mm (Fig. 294). South Thailand (Phuket) ..... *C. sp. 2*

## *Cycloptiloides lobicauda* sp. n.

Figs 64, 299-300, 321-322

*Holotype* (♀): Thailand: Kanchanaburi, near Erawan Waterfall, 14° 22' N, 99° 4' E, 31.i.-1.ii.1987, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♀). Body 7.1; pronotum 2.8; pronotum width 2.8; hind femur 5.5; hind tibia 3.9; hind metatarsus 1.5; ovipositor 3.0 mm. - Ratio pronotum length to width 1.0; ratio hind tibia to metatarsus 2.59.

*Description.* Frontal rostrum about three times wider than scapus; indistinctly furrowed in midline. Maxillary palps with apical segment slightly widened; apical segment a little longer than third and fourth segments (Fig. 321). Pronotum ♀ as wide as long; little narrowing in front; anterior margin substraight, posterior margin feebly convex; disc rounded into paranota (Fig. 64). Hind femur 1.4x longer than hind tibia; hind tibia 2.6x longer than metatarsus.

♂ unknown.

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate triangular (Fig. 322). Paraprocts prolonged, with a longitudinal setose carina. Subgenital plate rather long with sloping lateral margins; apex notched (Fig. 300). Ovipositor short; apical valves with margins smooth, dorsal margin setose, ventral margin with sparse hairs; apex obtuse, ventral margin of dorsal valve with 2 rounded lobes (Fig. 299).

Colouration. Mixed dark and light brown. Head black; mouthparts dark brown; maxillary palps blackish brown; antenna with scapus and pedicellus blackish brown; flagellum yellowish brown, darkened towards apex. Pronotum black with brown scales. Legs with alternating dark brown and whitish brown flecks or rings; hind femur whitish brown with dark marmoration. Abdomen ♀ with alternating dark brown and light brown scales. Supra-anal plate dark brown, covered with whitish brown scales. Subgenital plate dark brown. Cerci light brown, darkened at apex. Ovipositor medium brown, apical valves little darkened.

*Discussion.* *C. lobicauda* agrees with most of the characters of *Cycloptiloides* species from Asia including the female paraproct provided with a longitudinal carina. It differs by the large size, and the apex of the ovipositor which is not acute but obtuse and has the ventral margin of the dorsal apical valve lobular.

*Etymology.* The name refers to the lobular shape of the ovipositor apical valves.

### *Cycloptiloides orientalis* Chopard, 1925

Figs 293, 301-303

*Cycloptiloides orientalis* Chopard, 1925: 301; Otte *et al.*, 2005. Syntypes (1 ♂, 1 ♀). Indonesia: West Sumatra, Fort de Kock [Bukittinggi], 920 m, 1.-31.x.1920, leg. E. Jacobson (MNHN, not seen).

*Measurements* after Chopard (1925) (1 ♂, 1 ♀). Body ♂ 5, ♀ 5.5; pronotum ♂ 2.7, ♀ 1.9; hind femur ♂ 3.5, ♀ 4; ovipositor ♀ 2.5 mm.

*Diagnosis* (after descriptions and drawings in Chopard, 1925). Frontal rostrum faintly furrowed in midline. Maxillary palps with apical segment prolonged and only slightly widened; fourth segment longer than third (Fig. 301). Pronotum ♂ with lateral margins very little widening posteriorly; posterior margin convex, covering tegmen completely. Pronotum ♀ as long as wide; lateral margins convex, anterior area narrowed; anterior and posterior margins straight. Hind metatarsus as in Fig. 303.

♂ abdomen. «Tenth abdominal tergite» with apical margin convex, excised in middle; apico-lateral area with a short projection (Fig. 302); «epiproct» large, triangular. Paraproct process long, rounded, curved, densely covered with short hairs (Fig. 302). Subgenital plate large, rounded.

♀ abdomen. Subgenital plate triangular; apex truncate or faintly rounded. Ovipositor short, straight; apical valves little marked, with three rows of short hairs (Fig. 293).

Colouration. Greyish brown; antenna light brown; maxillary palps almost white. Abdomen ♂ grey. Supra-anal plate white. Cerci white at base.

*Discussion.* The species was originally described from a single pair from West Sumatra and well illustrated in both sexes (Chopard, 1925). Later it was also reported from India (Assam), Sri Lanka, and Malaysia (Chopard, 1969), recently recorded from Taiwan (Yang & Yen, 2001a) and as introduced to Finland (Ekbom, 1972). It is however questionable if all those records really refer to the same species. The description of *C. orientalis* in Chopard (1969) refer partly to his *C. ceylonicus* Chopard, 1925, described from a single male, which he later synonymized with *C. orientalis* (Chopard, 1968). The original descriptions of *C. orientalis* and *C. ceylonicus* differ with regard to colouration, maxillary palps, and abdominal terminalia, although in both long paraproct processes are mentioned. A re-examination of the types or topotypic specimens and study of their phallic complex would be necessary to verify if both taxa are really synonyms or separate species.

Diagnostic features of *C. orientalis* as can be taken from the original description are the elongate maxillary palps with the apex of the last segment strongly oblique, two short obtuse projections of the upper part of the male supra-anal plate («tenth tergite» in Chopard, 1925), and the long, erected, curved paraproct process in male. The female ovipositor apical valves are provided with three rows of hairs: at dorsal and ventral margins, and at ventral margin of the dorsal valves.

*Cycloptiloides pakchong* sp. n.

Figs 67, 304-306, 329-330

*Holotype* (♂): Thailand: Nakhon Ratchasima prov., Pak Chong, Wat Khao Chantree, 350 m, 14° 43' N, 101° 20' E, 9.iv.1995, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♂). Body 4.9; pronotum 3.0; tegmen 1.8; hind femur 3.2; hind tibia 2.3; pronotum width 1.9; hind metatarsus 1.0 mm. – Ratio pronotum length to width 1.61; ratio hind tibia to metatarsus 2.31.

*Description.* Frontal rostrum about two times broader than scapus, without medial furrow. Maxillary palps with apical segment prolonged and only slightly widened; fourth and fifth segments of equal length, little longer than third segment (Fig. 304). Pronotum ♂ with anterior dorsal margin concave; lateral margins slightly widening posteriorly; posterior margin convex, covering tegmen completely (Fig. 67). Hind femur 1.4x longer than hind tibia; hind tibia 2.3x longer than metatarsus.

♂ abdomen. Supra-anal plate wide-triangular; shallowly grooved in middle (Fig. 305). Paraproct process short, compressed, curved, setose (Fig. 306). Subgenital plate with apical margin rounded and upcurved. Phallic complex with apex bilobate, hyaline; with indistinct minute sclerotisation near apex (Figs 329-330).

♀ unknown.

Colouration. Brown. Head with frons dark brown; antenna with scapus and pedicellus dark brown, flagellum medium brown; darkened towards apex; maxillary palps dark brown. Pronotum blackish brown in front, dark reddish brown behind; lateral lobes with black ventral margin. Tegmen whitish transparent, at apex darkened; lateral area black above, white below. Legs with blackish brown scales. Abdomen ♂ blackish brown above, brown below. Cerci yellow with silver and dark brown scales.



*Discussion.* Differs from all other *Cycloptiloides* species of SE Asia by the small paraprocts with a minute process and by the specific phallic complex.

*Etymology.* Named after the type locality, noun in apposition.

*Cycloptiloides pui* sp. n.

Figs 65-66, 83, 297-298, 307-311, 325-328

*Holotype* (♂): Thailand: Chiang Mai, Doi Suthep-Pui, 1150-1350 m, 18° 48' N, 98° 55' E, 28.v.1997, leg. S. Ingrisch (ZFMK).

*Paratypes*: 1 ♂, same data as holotype (CI); 1 ♀, same locality, 1100-1200 m, 4.v.1988, leg. S. Ingrisch (ZFMK).

*Measurements* (2 ♂, 1 ♀). Body ♂ 7.4-8.1, ♀ 6.6; pronotum ♂ 3.1-3.3, ♀ 2.0; pronotum width ♂ 2.4, ♀ 2.1; tegmen ♂ 1.8-2.1; hind femur ♂ 4.1-4.3, ♀ 4.2; hind tibia ♂ 2.8-3.0, ♀ 3.0; hind metatarsus ♂ 1.2-1.3, ♀ 1.5; ovipositor ♀ 3.2 mm. – Ratio pronotum length to width ♂ 1.32-1.37, ♀ 0.91; ratio hind tibia to metatarsus ♂ 2.15-2.4, ♀ 2.04.

*Description.* Frontal rostrum about two times (♂) to three times (♀) broader than scapus; with or without a faint medial suture. Maxillary palps with apical segment prolonged and only slightly widened; three apical segments of subequal length (♂, Fig. 307) or fourth and fifth segments little longer than third (♀, Fig. 310). Pronotum ♂ with anterior dorsal margin concave; lateral margins slightly widening posteriorly; posterior margin convex, covering tegmen completely (Fig. 65). Pronotum ♀ little wider than long, scarcely narrowing in front; anterior margin concave; posterior margin feebly convex; lateral lobes nearly angularly inserted to disc (Fig. 66). Hind femur 1.4-1.5x longer than hind tibia; hind tibia 2.0-2.4x longer than metatarsus (Fig. 83).

♂ abdomen. Supra-anal plate wider than long, apex convex; furrowed in middle, with tufts of long hair on both sides (Fig. 308). Paraproct process long, compressed, curved, dark brown, densely covered with short hairs (Fig. 309). Subgenital plate apical margin rounded and setose. Ectophallus with three dark brown sclerites (one pair and one unpaired sclerite) and with a pair of minute hooks (Figs 325-328).

♀ abdomen. Ninth abdominal tergite with apex feebly concave. Supra-anal plate triangular with apex broadly rounded; shallowly grooved in middle; lateral areas and apex setose (Fig. 311). Paraprocts prolonged, with a longitudinal setose carina. Subgenital plate triangular with margins upcurved; apex little concave (Fig. 298). Ovipositor of medium length; apical valves with margins smooth; with few long hairs near apex and dorsal and ventral margins with a row of short hairs (Fig. 297).

*Colouration.* Mostly blackish brown. Head with vertex blackish brown; frons dark reddish brown, labrum yellowish brown; antenna with scapus and pedicellus blackish brown, flagellum yellowish brown, darkened towards apex; maxillary palps dark brown. Pronotum dark reddish brown with shining black scales; lateral lobes with black ventral margin. Tegmen white, at apex darkened; lateral area white in anterior, darkened in posterior area. Legs with shining blackish brown scales, light brown when removed; hind femur dark reddish brown with shining brown scales, in dorsal area with black scales. Abdomen ♂ blackish brown, less dark from below. Cerci with blackish brown and few light scales, light brown when removed. Abdomen ♀ dark reddish

brown with shining black scales, on ventral side with brown scales. Subgenital plate brown. Cerci black, very base and very apex light brown. Ovipositor yellowish brown, apical valves brown.

*Discussion.* The new species comes close to *C. orientalis*, differs in ♂ by the paraproct process which is compressed, laterally widened, and shorter, and by the absence of projections on the upper area of the supra-anal plate. The characteristic phallic complex probably also differs but is not described for *C. orientalis* from the type locality. It clearly differs from the phallic complex described and figured by Yang & Yen (2001a) under *C. orientalis* from Taiwan. The ♀ differs by the ovipositor apical valves which carry few mixed short and long hairs.

*Etymology.* Named after the type locality, noun in apposition.

***Cycloptiloides timah* sp. n.**

Figs 62-63, 81, 296, 312-315, 323-324

*Holotype* (♂): Singapore: Bukit Timah, 1° 20' N, 103° 47' E, 1.-2.iii.1993, leg. S. Ingrisch (ZFMK).

*Paratypes:* 2 ♂, 1 ♀, same data as holotype (2 ♂ CI; 1 ♀, ZFMK).

*Measurements* (3 ♂, 1 ♀). Body ♂ 5.2-5.4, ♀ 6.2; pronotum ♂ 3.0-3.2, ♀ 1.9; pronotum width ♂ 1.9-2.0, ♀ 1.9; hind femur ♂ 3.5-3.7, ♀ 3.9; hind tibia ♂ 2.6-2.9, ♀ 2.8; hind metatarsus ♂ 0.9-1.3, ♀ 1.2; ovipositor ♀ 2.8 mm. – Ratio pronotum length to width ♂ 1.52-1.63, ♀ 1; ratio hind tibia to metatarsus ♂ 2.15-3.05, ♀ 2.31.

*Description.* Frontal rostrum about one and a half time wider than scapus; without medial furrow. Maxillary palps with apical segment prolonged and only slightly widened; apical segment a little longer than third and fourth segments (Fig. 312). Pronotum ♂ with anterior dorsal margin concave; lateral margins very little widening posteriorly; posterior margin convex, covering tegmen completely (Fig. 62). Pronotum ♀ as wide as long, slightly narrowing in front; anterior margin concave; posterior margin feebly convex (Fig. 63). Hind femur 1.2-1.4x longer than hind tibia; hind tibia 2.1-2.4x longer than metatarsus.

♂ abdomen. Supra-anal plate large, grooved; apex subtruncate (Fig. 313). Paraproct process short, compressed, not curved up, dark brown, setose (Fig. 314). Subgenital plate rounded, apex truncate. Phallus cylindrical, hyaline; lateral valves with indistinct minute sclerotisation at apex (Figs 323-324).

♀ abdomen. Supra-anal plate large, triangular with apex rounded, furrowed in middle; with long hairs along margins (Fig. 315). Paraprocts prolonged, with a longitudinal setose carina (Fig. 81). Subgenital plate triangular; apex truncate. Ovipositor of medium length; apical valves narrow, dorsal margin of ventral valves with two bristles (Fig. 296).

*Colouration.* Dark brown. Head with frons dark brown; antenna unicoloured, brown; maxillary palps not very conspicuous brown, last two segments black. Pronotum dark reddish brown. Tegmen whitish transparent, at apex with a black band; lateral area black above, white below. Legs yellow with black and brown marmoration; usually tibiae with shining black scales. Abdomen ♂ dark brown above, light brown below. Cerci yellow, suffused with black scales except at base. Abdomen ♀ with black scales above, silver scales below. Subgenital plate with silver scales. Cerci yellow, suffused with black scales except at base. Ovipositor yellowish brown, apical valves reddish brown.

*Discussion.* The male of the new species can readily be distinguished from *C. orientalis*, *C. pui* and *C. pakchong* by the short paraproct process which is not upcurved and by the phallic complex. From *C. orientalis* it also differs by the maxillary palps with the apical segment being hardly widened. The female differs from *C. orientalis* and *C. pui* by the ovipositor apical valves which carry only a few short stout hairs.

*Etymology.* Named after the type locality Bukit Timah, noun in apposition.

### *Cycloptiloides* sp. 1

Figs 68, 295, 318-320

*Derectaotus incertus* Ingrisch, 1998: 232 partim [♀ not a type].

*Material studied:* 1 ♀, East Malaysia: Sabah, Mt. Kinabalu NP, Poring, 6° 5' N, 116° 33' E, 500-700 m, canopy fogging, 6° 5' N, 116° 33' E, 28.iii.1998, leg. A. Floren (ZFMK); 1 ♀ (*Derectaotus incertus* Ingrisch, 1998, misidentification), same locality, 16.ii.1994, leg. A. Floren (CI); 1 ♀, Sabah, Sandakan residency, Sepilok, Kabili-Sepilok Forest Reserve, forêt près du pond, 10.v.1982, leg. Bernd Hauser (MHNG).

*Measurements* (3 ♀). Body 5.6-7.4; pronotum 1.8; pronotum width 1.9; hind femur 4.0-4.1; hind tibia 2.8-2.9; hind metatarsus 1.3; ovipositor 2.5-2.6 mm. – Ratio pronotum length to width 0.93; ratio hind tibia to metatarsus 2.25.

*Description.* Frontal rostrum about two times broader than scapus, without medial furrow. Maxillary palps with apical segment little widened and little longer than third and fourth segments; third and fourth segments of equal length (Fig. 318). Pronotum ♀ little wider than long or as long as wide, scarcely narrowing in front; anterior margin slightly concave; posterior margin straight (Fig. 68). Hind femur 1.4x longer than hind tibia; hind tibia 2.2-2.3x longer than metatarsus.

♂ unknown.

♀ abdomen. Supra-anal plate rounded; furrowed in middle; with long hairs at lateral margins (Figs 319-320). Paraprocts prolonged, with a longitudinal setose carina. Subgenital plate triangular in general outline; apex truncate or little notched. Ovipositor of medium length, slightly curved; apical valves with margins smooth, with few short stout hairs (Fig. 295).

Colouration. Dark brown. Head with frons brown, labrum almost white; antenna with scapus and pedicellus brown, flagellum light to medium brown; maxillary palps brown. Pronotum dark reddish brown. Legs [scales largely removed] light brown or almost white; where scales are left dark brown. Abdomen ♀ [scales largely removed] brown or almost white. Subgenital plate medium brown. Cerci [scales largely removed] white. Ovipositor yellowish brown.

*Discussion.* The three females at hand are similar to *C. timah* and *C. sp. 2*. They differs from both by the shorter ovipositor and the maxillary palps with the apical segment wider. From *C. timah* they also differs by the wider apex of the supra-anal plate. They probably represent an undescribed species, but without corresponding male it is difficult to find veritable differential characters.

One of the females was erroneously described under *D. incertus* in Ingrisch (1998) without giving it type status (see above under *M. incertus*).

### *Cycloptiloides* sp. 2

Figs 69, 294, 316-317

*Material studied:* 2 ♀, Thailand: Phuket, Khao Pra Taew, near Bangbae and Tone Sai Waterfalls, 8° 1' N, 98° 22' E, 11.vi.1986, leg. S. Ingrisch (1 ♀, ZFMK; 1 ♀, CI).

*Measurements* (2 ♀). Body 5.3-5.6; pronotum 1.9-2.0; pronotum width 2.1; hind femur 3.9-4.1; hind tibia 2.7-2.8; hind metatarsus 1.2-1.4; ovipositor 2.8 mm. – Ratio pronotum length to width 0.94-0.97; ratio hind tibia to metatarsus 2.10-2.15.

*Description.* Frontal rostrum about two times broader than scapus; without medial furrow. Maxillary palps with apical segment little widened and little longer than third and fourth segments (Fig. 316). Pronotum ♀ as wide as long; slightly narrowing in front; anterior margin concave, posterior margin feebly convex (Fig. 69). Hind femur 1.4-1.5x longer than hind tibia; hind tibia 2.1x longer than metatarsus.

♂ unknown.

♀ abdomen. Supra-anal plate large, triangular with apex rounded; with long hairs along margins (Fig. 317). Paraprocts prolonged, with a longitudinal setose carina. Subgenital plate triangular in general outline; apex truncate. Ovipositor of medium length; apical valves narrow; dorsal margin of ventral valves with 2-3 bristles (Fig. 294).

*Colouration.* Brown. Head with frons dark brown; antenna unicoloured brown; maxillary palps not very conspicuous brown, last two segments black. Pronotum dark reddish brown. Legs with silver, brown and black scales. Abdomen ♀ dark with shining scales. Subgenital plate brown. Cerci yellow, suffused with black scales except at base. Ovipositor yellowish brown, apical valves reddish brown.

*Discussion.* The two females at hand are similar to *C. timah* but differ by a wider supra-anal plate. From *C. sp. 1* which is also similar, they differ by the narrow apical segment of the maxillary palps, the shape of the supra-anal plate and a longer ovipositor. Although the differences to both other taxa are gradual, the two females probably belong to another undescribed species. Probably the corresponding male will show clear differential characters when it is found.

### *Terraplistes* gen. n.

*Type species: Terraplistes chantri* sp. n.; here designated.

*Description.* Small to medium sized (body 6.8-11.2 mm, hind femur 3.8-5.8 mm) Mogoplistinae; black or with few white ornaments (Figs 70-76). Body dorso-ventrally compressed. Maxillary palps of variable shape; apical segment moderately widened (Figs 332, 336, 340, 343-344). Pronotum with lateral lobes nearly angularly inserted to disc; in male prolonged and covering tegmen completely, in female of normal length. Tegmen male reduced to stridulatory apparatus; females apterous. Fore tibia with internal tympanum almost moved to anterior surface. Hind tibia shortened, less than twice as long as metatarsus, in lateral view behind base suddenly widened and compressed; dorsal margins serrulate (Fig. 84). Hind metatarsus with dorsal margins serrulate and with a row of short, stout spines in middle.

♂ abdomen. Supra-anal plate and epiproct completely fused (Figs 331, 335). Paraprocts with a short club-shaped projection pointing mediad, largely hidden under the supra-anal plate (Figs 333, 337, 345). Phallic complex: no sclerotised parts found. Subgenital plate wider than long.

♀ abdomen. Supra-anal plate completely fused with epiproct (Figs 334, 338-339, 341-342). Subgenital plate wider than long or elongate with lateral margins



upcurved; apex truncate or excised (Figs 348-356). Ovipositor apical valves acute, with few short hairs (Figs 346-347, 349, 351, 353, 355).

*Discussion.* The new genus comes close to *Cycloptiloides* and *Micronebius*. It differs from both by the dorso-ventrally compressed body, the pronotum which is almost angularly bent to the lateral lobes, the compressed and widened hind tibiae, the absence of sclerotised structures of the male phallic complex, and the acute apical valves of the ovipositor. Additionally, it differs from *Cycloptiloides* by the maxillary palps which are less narrow and have the apical segment widened, and the female paraprocts are short and without longitudinal carina; from *Micronebius* it also differs by the maxillary palps which are longer and the apical segment less strongly widened, and the apical valves of the ovipositor carry only a few short hairs. Six species are assigned here with *Terraplistes*, *T. niger* (Ingrisch, 1987) comb. n. and five species described as new. They can be differentiated by the shape and colour pattern in both sexes, by the paraproct and its appendage in the male, and by the shape of the subgenital plate and the relative length of the ovipositor in the female.

*Distribution.* *Terraplistes* is so far only known from Thailand. All species were found in the litter of primary or secondary forests or scrubland.

*Etymology.* Composed of «terra» [here: living on the soil] and the stem «plistes» from the genus *Mogoplistes*.

#### KEY TO SPECIES

##### MALES

- 1 Maxillary palps fully black; third to fifth segments rather long (Fig. 336). Paraprocts with a short, club-shaped projection, separated by a wide gap from base (Fig. 337). North East Thailand (Loei) . . . *T. kradung* sp. n. (compare also *T. excisa*, *T. erawan*, *T. brevicauda* for which the males are unknown)
- Maxillary palps with apical two segments white. Paraprocts different . . . . . 2
- 2 Maxillary palps with third segment black (Fig. 344). Paraprocts with a club-shaped projection, with the club higher than the paraproct base (Fig. 345). Larger species: pronotum 3.6 mm, hind femur 4.5 mm. Central Thailand (Chon Buri) . . . . . *T. niger* (Ingrisch, 1987)
- Maxillary palps with at least apical half of third segment white (Fig. 332). Paraprocts with a small club-shaped projection, separated by a narrow gap from base (Fig. 333). Smaller species: pronotum 3.3-3.4 mm, hind femur 4.1-4.2 mm. Central Thailand (Nakhon Ratchasima) . . . . . *T. chantri* sp. n.

##### FEMALES

- 1 Large for the genus (Fig. 72), pronotum 2.9 mm, hind femur 5.8 mm. Maxillary palps black with apices of first and second segments white; fifth segment with apex moderately oblique (Fig. 343). Subgenital plate transverse, apex angularly excised (Fig. 352). Ovipositor 2.5 mm (Fig. 351). South Thailand (Prachuap Khiri Khan) . . . . . *T. excisa* sp. n.
- Smaller: pronotum 2.0-2.5 mm, hind femur 3.8-4.5 mm. Maxillary palps either completely black or apical segments white; fifth segment with

- apex strongly oblique (Figs 332, 336, 340). Subgenital plate elongate, apex truncate or faintly concave (Figs 348, 350, 354, 356) ..... 2
- 2 Ovipositor less than twice the length of the subgenital plate (1.4 mm; Fig. 355). Pronotum along lateral margins with a band of white scales (Fig. 76). Central Thailand (Saraburi) ..... *T. brevicauda* sp. n.
- Ovipositor double the length of the subgenital plate or longer (1.6-2.5 mm). Pronotum black ..... 3
- 3 Maxillary palps with half of third segment and apical two segments white (Fig. 332). Ovipositor 1.9-2.5 mm (Fig. 346). Central Thailand (Nakhon Ratchasima) ..... *T. chantri* sp. n.
- Maxillary palps completely black (Figs 336, 340) ..... 4
- 4 Maxillary palps with three last segments rather elongate (Fig. 336). Ovipositor 2.3 mm (Fig. 349). North East Thailand (Loei) ... *T. kradung* sp. n.
- Maxillary palps with three last segments rather short, apical segment triangular (Fig. 340). Ovipositor 1.6-1.9 mm (Fig. 353). Central Thailand (Kanchanaburi) ..... *T. erawan* sp. n.

***Terraplistes brevicauda* sp. n.**

Figs 76, 341, 355-356

*Holotype* (♀): Thailand: Saraburi, Nam Tok Muak Lek, 14° 43' N, 101° 13' E, 7.ix.1993, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♀). Body 7.4; pronotum 2.5; pronotum width 2.5; hind femur 4.5; hind tibia 2.9; hind metatarsus 1.5; ovipositor 1.4 mm. – Ratio pronotum length to width 1; ratio hind tibia to metatarsus 1.92.

*Description*. Frontal rostrum about three times wider than scapus, without medial furrow. Pronotum ♀ as wide as long; lateral margins slightly convex; anterior margin concave; posterior margin truncate (Fig. 76). Hind femur 1.5-1.6x longer than hind tibia; hind tibia 1.9x longer than metatarsus.

♂ unknown.

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate rounded; margins carinate and provided with long bristles (Fig. 341). Paraprocts simple, setose. Subgenital plate with little converging, upcurved lateral margins; apex broad, slightly concave in middle, convex at both sides (Fig. 356). Ovipositor only 1.8x the length of the subgenital plate; apical valves narrow (Fig. 355).

*Colouration*. Black. Head black; vertex ornated with lateral bands of white scales from top of rostrum, along internal margin of eyes to occiput; antenna with scapus and pedicellus black; [flagellum broken]. Pronotum ♀ black; lateral margins of disc ornated with a band of white scales. Legs dark reddish brown covered with black scales; hind femur of lighter colour, dorsal area also black. Abdomen ♀ black; ventral side black covered with white scales. Subgenital plate black. Cerci yellowish brown. Ovipositor brown.

*Discussion*. *T. brevicauda* differs from all other *Terraplistes* species by the white lateral bands from frontal rostrum to occiput, continued on lateral margins of disc of pronotum, and by the very short ovipositor measuring less than twice the length of the subgenital plate.

*Etymology*. Named after the short ovipositor.

*Terraplistes chantri* sp. n.

Figs 70-71, 331-334, 346-348

*Holotype* (♂): Thailand: Nakhon Ratchasima, Pak Chong, Wat Khao Chantree, 350 m, 14° 43' N, 101° 20' E, 9.iv.1995, leg. S. Ingrisch (ZFMK).

*Paratypes*: 1 ♂, 2 ♀, same data as holotype (1 ♂, 1 ♀, CI; 1 ♀, ZFMK).

*Measurements* (2 ♂, 2 ♀). Body ♂ 7.3-7.8, ♀ 7.5-7.7; pronotum ♂ 3.3-3.4, ♀ 2.2-2.3; pronotum width ♂ 2.4, ♀ 2.3-2.4; hind femur ♂ 4.1-4.2; ♀ 4.4; hind tibia ♂ 2.6-2.7, ♀ 2.7-2.8; hind metatarsus ♂ 1.4-1.5, ♀ 1.4-1.6; ovipositor ♀ 1.9-2.5 mm. – Ratio pronotum length to width ♂ 1.37-1.42; ♀ 0.95-0.97; ratio hind tibia to metatarsus ♂ 1.79-1.86; ♀ 1.80-1.87.

*Description*. Frontal rostrum about three and half times wider than scapus, without medial furrow. Maxillary palps with apical segment moderately widened, apex strongly oblique; fourth and fifth segments longer than third segment (Fig. 332). Pronotum ♂ with anterior margin concave; lateral margins hardly narrowed in front; posterior margin convex, covering tegmen completely (Fig. 70). Pronotum ♀ as wide as long; scarcely narrowing in front; anterior margin feebly concave, posterior margin feebly convex (Fig. 71). Hind femur 1.5-1.6x longer than hind tibia; hind tibia 1.8-1.9x longer than metatarsus.

♂ abdomen. Supra-anal plate with a pair of sinuate lateral carinae; apex convex (Fig. 331). Paraprocts with a club-shaped projection, separated by a narrow gap from base (Fig. 333). Subgenital plate wider than long; apex convex and setose, faintly convex or faintly concave in middle.

♀ abdomen. Ninth abdominal tergite with apex feebly convex. Supra-anal plate with V-shaped, sublateral carina; carina provided with long bristles; apex convex and setose (Fig. 334). Paraprocts simple, setose. Subgenital plate with lateral margins convex and upcurved; apex truncate (Fig. 348). Ovipositor short; apical valves on dorsal and ventral margins with few short hairs (Figs 346-347).

*Colouration*. Black to blackish brown, covered with black scales. Head black; frons blackish brown; antenna with scapus black, flagellum yellowish brown with spaced dark annulation; maxillary palps to base of third segment black, apical segments white. Pronotum black. Tegmen white, at apex with hardly visible infumation; lateral area white. Legs dark reddish brown covered with black scales. Abdomen ♂ dark brown with black scales, ventral surface less dark. Subgenital plate dark brown with black scales. Cerci black. Abdomen ♀ as in ♂. Subgenital plate dark brown with black scales. Cerci black. Ovipositor brown.

*Discussion*. *T. chantri* can readily be distinguished from all other *Terraplistes* species by the colour pattern of the maxillary palps which are black at base and white from the middle of the third segment. The male paraprocts are similar to that of *T. kradung* but the gap between the apical club and the base of the paraproct is narrower. In the female, *T. chantri* has the ovipositor more than twice as long as the subgenital plate which separates it from *T. brevicauda*; from *T. erawan* it differs by the longer ovipositor (1.9-2.5 mm against 1.6-1.9 mm) and the narrow subgenital plate, and from *T. kradung* by the narrow subgenital plate and the fifth segment of the maxillary palps which is in lateral view triangular not elongate. The latter character applies to both sexes.

*Etymology*. Named after the type locality Khao Chantree [Chantree mountain]; noun in apposition with the English vowel «ee» Latinized to «i».

***Terraplistes erawan* sp. n.**

Figs 75, 339-340, 353-354

*Holotype* (♀): Thailand: Kanchanaburi, Nam Tok Erawan, 14° 20' N, 99° 8' E, 9.iv.1994, leg. S. Ingrisch (ZFMK).

*Paratypes*: 3 ♀, same data as holotype (1 ♀, CI, 1 ♀ MHNG, 1 ♀, EMBT).

*Measurements* (4 ♀). Body 6.8-7.3; pronotum 2.1-2.2; pronotum width 2.3-2.5; hind femur 3.8-4.1; hind tibia 2.4-2.6; hind metatarsus 1.1-1.4; ovipositor 1.6-1.9 mm. – Ratio pronotum length to width 0.85-0.97; ratio hind tibia to metatarsus 1.86-2.23.

*Description*. Frontal rostrum about three times wider than scapus, without medial furrow. Maxillary palps with apical segment moderately widened, apex strongly oblique; fourth and fifth segments longer than third segment (Fig. 340). Pronotum ♀ little wider than long; little narrowing in front; anterior margin concave, posterior margin feebly convex (Fig. 75). Hind femur 1.5-1.6x longer than hind tibia; hind tibia 1.9-2.2x longer than metatarsus.

♂ unknown.

♀ abdomen. Supra-anal plate grooved in middle; apex rounded and setose (Fig. 339). Paraprocts simple, setose. Subgenital plate with little converging upcurved lateral margins; apex truncate (Fig. 354). Ovipositor short; apical valves narrow, dorsal and ventral margins with few short hairs (Fig. 353).

*Colouration*. Black. Head black; antenna with scapus black, flagellum yellowish brown, darkened towards apex; maxillary palps black. Pronotum black. Legs black; hind femur dark brown with dorsal and apical areas black. Abdomen ♀ black from above, brown from below. Subgenital plate black in basal half, brown in apical half and along margins. Cerci yellowish brown to blackish brown, infumate. Ovipositor brown.

*Discussion*. *T. erawan* differs from *T. excisa*, *T. chantri* and *T. niger* by the uniformly black maxillary palps, from *T. excisa* and *T. kradung* by the maxillary palps having shorter segments and the apical segment being distinctly widened in middle make it looking triangular in lateral view. The ovipositor is shorter than in *T. excisa*, *T. chantri* and *T. kradung*, but longer than in *T. brevicauda*. It is so far the smallest species of the genus, but the differences in size to *T. brevicauda* are negligible.

*Etymology*. Named after the type locality, Erawan waterfall; noun in apposition.

***Terraplistes excisa* sp. n.**

Figs 72, 342-343, 351-352

*Holotype* (♀): Thailand: Prachuap Khiri Khan, Kaeng Krachan area, near Pala-U waterfall, 12° 35' N, 99° 32' E, 2.iv.1993, leg. S. Ingrisch (ZFMK).

*Measurements* (1 ♀). Body 11.2; pronotum 2.9; pronotum width 3.1; hind femur 5.8; hind tibia 3.5; hind metatarsus 1.6; ovipositor 2.5 mm. – Ratio pronotum length to width 0.94; ratio hind tibia to metatarsus 2.15.

*Description*. Frontal rostrum about three times wider than scapus, faintly furrowed in midline; maxillary palps with fourth and fifth segments slightly widened, of equal length; fourth segment longer than third (Fig. 343). Pronotum ♀ little wider than long, scarcely narrowing in front; anterior margin concave; posterior margin truncate (Fig. 72). Hind femur 1.6x longer than hind tibia; hind tibia 2.4x longer than metatarsus.

♂ unknown.

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate wider than long; apex convex with a bunch of long hairs at both sides of middle



(Fig. 342). Paraprocts simple. Subgenital plate with almost parallel margins in basal half; apex bilobate (Fig. 352). Ovipositor short; apical valves with margins smooth (Fig. 351).

**Colouration.** Black, covered with black scales and light brown hairs. Head black; frons reddish brown; antenna with scapus reddish brown, flagellum yellowish brown with spaced dark annulation; maxillary palps black. Pronotum black; disc margined with white scales. Legs black; inner side of hind femur brown. Abdomen ♀ black, on ventral side black and covered with white scales. Subgenital plate black. Cerci changing from light brown at base to almost black at apex. Ovipositor dark brown.

**Discussion.** *T. excisa* differs from all other *Terraplistes* species by larger size, the maxillary palps having the apices of the first two segments white while the last three are uniformly black and the apical segment is hardly widened, and by the subgenital plate which is transverse instead of elongate and has the apex triangularly excised.

**Etymology.** Named after the excised subgenital plate.

***Terraplistes kradung* sp. n.**

Figs 73-74, 84, 335-338, 349-350

**Holotype** (♂): Thailand: Loei prov., Phu Kradung, 1500 m, 16° 55' N, 101° 47' E, 27.v.1988, leg. S. Ingrisch (ZFMK).

**Paratypes:** 1 ♂, 1 ♀, same data as holotype (1 ♂, CI; 1 ♀, ZFMK).

**Measurements** (2 ♂, 1 ♀). Body ♂ 8.4-8.6, ♀ 8.1; pronotum ♂ 3.6-3.8, ♀ 2.5; pronotum width ♂ 2.9-3.0; hind femur ♂ 4.7, ♀ 4.5; hind tibia ♂ 3.0-3.2, ♀ 2.7; ♀ 2.8; hind metatarsus ♂ 1.6, ♀ 1.4; ovipositor ♀ 2.3 mm. – Ratio pronotum length to width ♂ 1.26-1.28; ♀ 0.91; ratio hind tibia to metatarsus ♂ 1.87-1.99, ♀ 1.95.

**Description.** Frontal rostrum about three times wider than scapus, without medial furrow. Maxillary palps with apical segment moderately widened, apex strongly oblique; segments increasing in length from third to fifth segment (Fig. 336). Pronotum ♂ with anterior dorsal margin concave; lateral margins convex; posterior margin convex, covering tegmen completely (Fig. 73). Pronotum ♀ longer than wide; lateral margins slightly convex; anterior margin concave, posterior margin feebly convex (Fig. 74). Hind femur 1.5-1.7x longer than hind tibia; hind tibia 1.9-2.0x longer than metatarsus (Fig. 84).

♂ abdomen. Supra-anal plate completely fused with epiproct. Supra-anal plate with a pair of substraight, oblique, sublateral carinae carrying long bristles; remnants of lateral appendages of terminal tergite appear as lateral appendages of base of carina; apex convex (Fig. 335). Paraprocts triangular at both sides, narrowed in between, internal and dorsal margins setose (Fig. 337). Subgenital plate wider than long; apical margin convex at both sides, slightly concave in middle.

♀ abdomen. Ninth abdominal tergite with apex subtruncate. Supra-anal plate with slightly curved, sublateral carina; carina provided with long bristles; apex convex and setose (Fig. 338). Paraprocts simple, setose. Subgenital plate with lateral margins convex and upcurved; apex truncate (Fig. 350). Ovipositor of medium length; apical valves with margins smooth; dorsal and ventral margins with few short hairs (Fig. 349).

**Colouration.** Black. Head black; frons blackish brown; clypeus white; mandibles reddish brown; antenna with scapus and part of pedicellus dark brown,

flagellum yellowish brown with spaced dark annulation; maxillary palps black. Pronotum black with dark reddish brown scales; in one male only lateral margins of disc ornated with a band of white scales. Tegmen white. Legs black; hind femur dark reddish brown with black scales. Abdomen ♂ black or very dark reddish brown with black scales; underside dark reddish brown. Subgenital plate black. Cerci reddish brown, darkened or black towards apex. Abdomen ♀ as in ♂. Subgenital plate black, apex brown. Cerci as in male. Ovipositor brown.

*Discussion.* *T. kradung* is close to *T. chantri*. It differs by the maxillary palps which are completely black and have the fifth segment elongate. The male paraprocts have the club-shaped projection separated from the paraproct base by a wide gap. The female subgenital plate is wider.

*Etymology.* Named after the type locality Phu Kradung [Mount Kradung]; noun in apposition.

***Terraplistes niger* (Ingrisch, 1987) comb. n.**

Figs 344-345

*Cycloptiloides niger* Ingrisch, 1987: 174; Otte *et al.*, 2005. Holotype (♂): Thailand: Chon Buri, south of Pattaya, 12° 52' N, 100° 53' E, 1.-4.iv.1985, leg. S. Ingrisch (SMF).

*Measurements* (1 ♂). Body male 7.3; pronotum male 3.6; hind femur male 4.5; hind tibia male 2.9; hind metatarsus male 1.6 mm. – Ratio hind tibia to metatarsus male 1.81.

*Diagnosis.* Frontal rostrum almost four times wider than long. Maxillary palps with apical segment moderately widened, apex strongly oblique; fourth and fifth segments longer than third segment (Fig. 344). Hind femur 1.5-1.6x longer than hind tibia; hind tibia 1.8x longer than metatarsus.

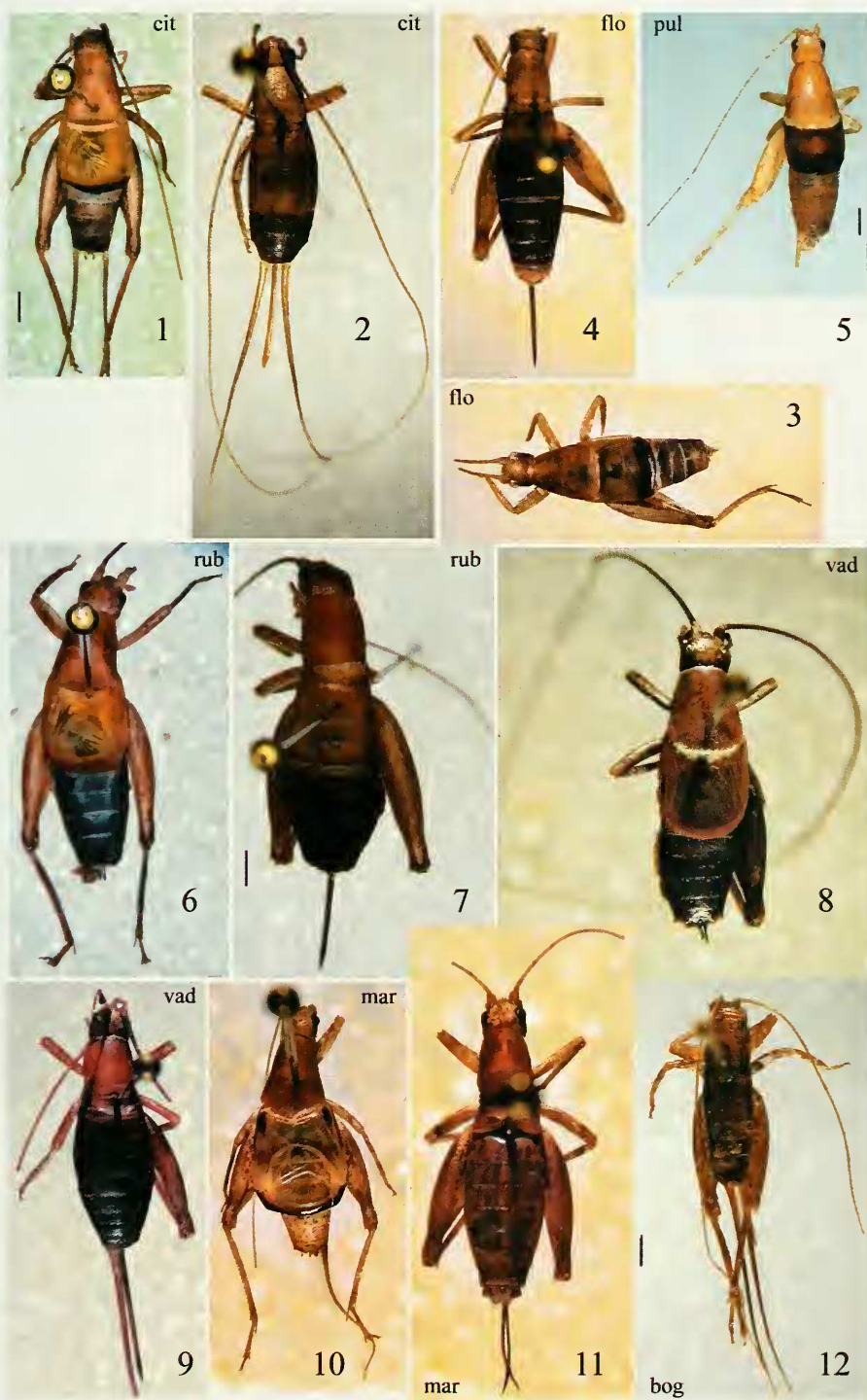
♂ abdomen. Paraprocts with a club-shaped projection, with the club larger than the paraproct base, and densely covered by long hairs at internal margin (Fig. 345).

♀ unknown.

*Colouration.* Head black; frons dark brown; mouthparts dark brown; antenna dark brown; maxillary palps with basal three segments dark brown, apical two segments white. Pronotum black. Tegmen white. Legs black; hind femur towards ventral area dark brown, on internal side with light brown or silver scales. Abdomen ♂ black; ventral surface dark brown. Cerci brown (damaged). Body and legs covered with shining black scales, 4. and 5. joint of maxillary palps and elytra contrasting white; fifth segment of maxillary palps less slender than in other *Cycloptiloides* species, triangular.

*Discussion.* The species was originally described under *Cycloptiloides*. It possesses however all the characters that separate *Terraplistes* from *Cycloptiloides*. It is readily recognisable by the maxillary palps with the basal three segments black and the apical two segments white. The club-shaped projections of the paraprocts are larger than the paraproct base which is not so in other *Terraplistes* species of which the males are known. As the original description was in German, a short diagnosis is given here.

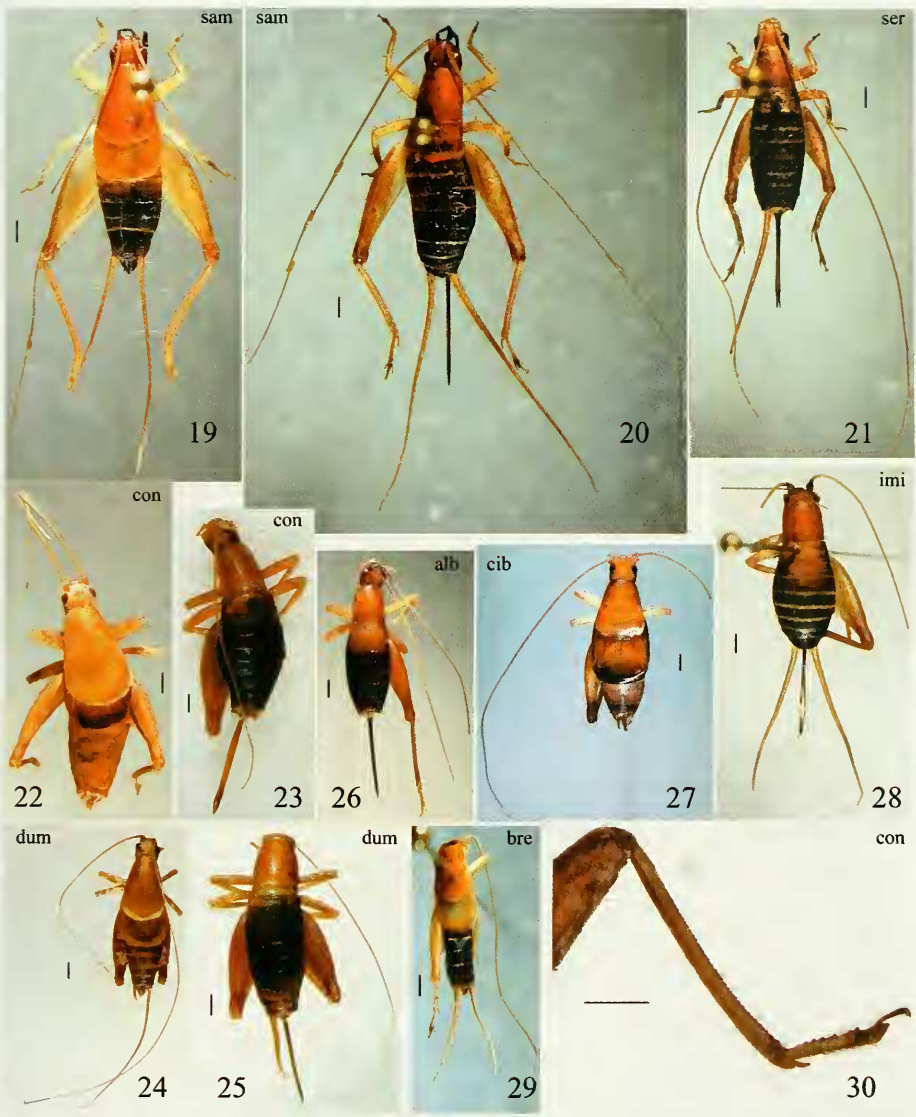
FIGS 1-12. Habitus of *Ornebius* species: 1, *O. citrus* sp. n. ♂ HT; 2, do. ♀ PT; 3, *O. flori* Ingrisch, 1998 ♂ (Poring); 4, do. ♀; 5, *O. pullus* sp. n. ♂ HT; 6, *O. rubidus* Ingrisch, 1998 ♂ (Poring); 7, do. ♀; 8, *O. vadus* Ingrisch, 1998 ♂ (Poring); 9, do. ♀; 10, *O. marginatus* Ingrisch, 1998 (Poring); 11, do. ♀; 12, *O. bogor* sp. n. ♀ HT. Scales = 1 mm.



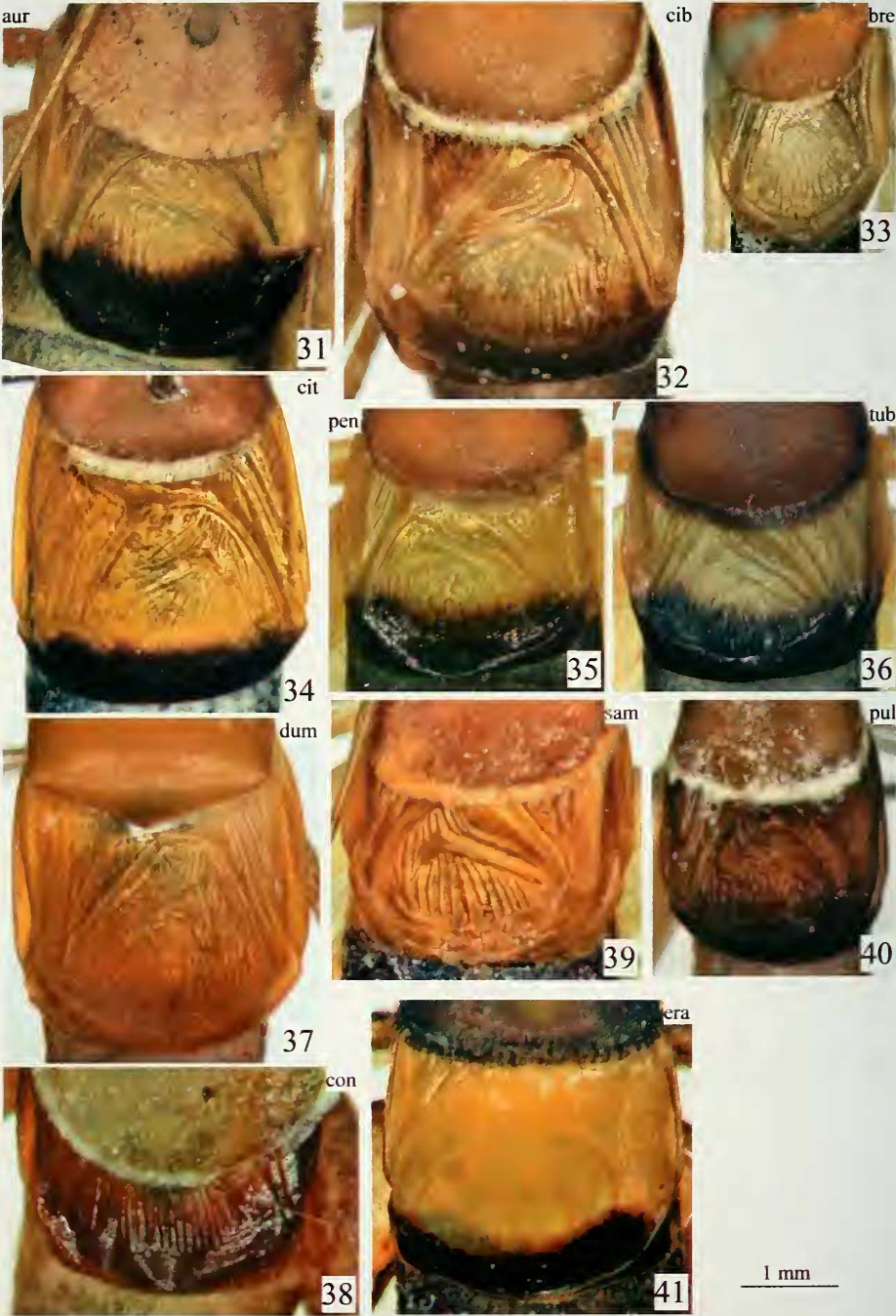


FIGS 13-18. Habitus of *Ornebius* species: 13, *O. aureus* sp. n. ♂ HT; 14, do. ♀ PT; 15, *O. angustus* sp. n. ♀ HT; 16, *O. tuberculatus* sp. n. ♂ HT; 17, do. ♀ PT; 18, *O. peniculatus* sp. n. ♂ HT. The arrow in fig. 16 points to the transverse swelling of the vertex. Scales = 1 mm.





FIGS 19-30. Habitus of *Ornebius* species: 19, *O. samudra* sp. n. ♂ PT; 20, do. ♀ PT; 21, *O. serratus* sp. n. ♀ HT; 22, *O. consternus* sp. n. ♂ HT; 23, do. ♀ PT; 24, *O. dumoga* sp. n. ♂ HT; 25, do. ♀ PT; 26, *O. albipalpus* sp. n. ♀ HT; 27, *O. cibodas* sp. n. ♂ HT; 28, *O. imitatus* sp. n. ♀ HT; 29, *O. brevipalpus* sp. n. ♂ HT; 30, left hind leg of *O. consternus*. Scales = 1 mm.

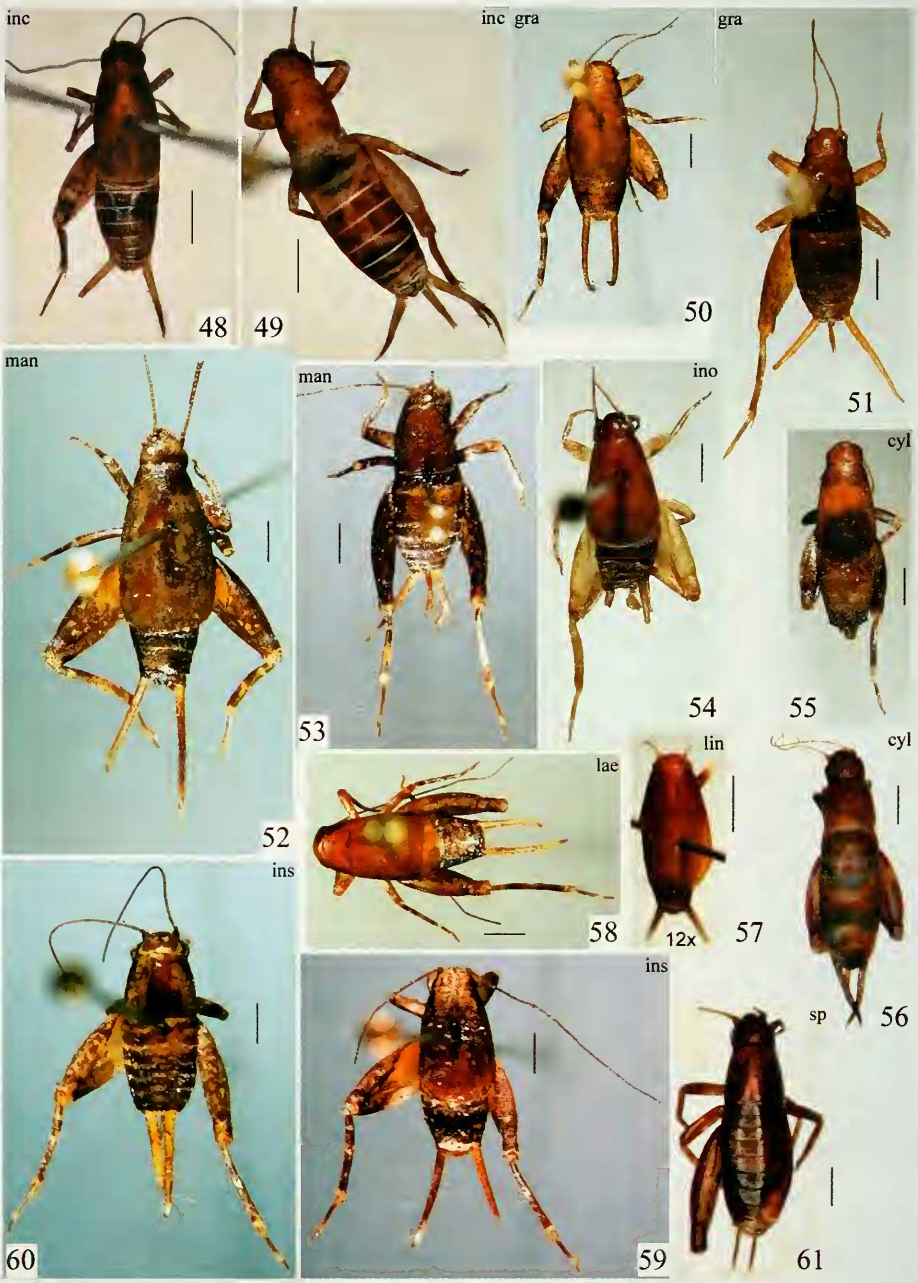




FIGS 42-47. Habitus of *Apterornebius*, *Gotwendia* and *Ectatoderus* species: 42, *A. chong* sp. n. ♀ HT; 43, *A. kinabalu* sp. n. ♂ HT; 44, do. ♀ PT; 45, *G. erawan* sp. n. ♂ HT; 46, *E. samui* sp. n. ♂ HT; 47, *E. argentatus* sp. n. ♂ HT. Scales = 1 mm.

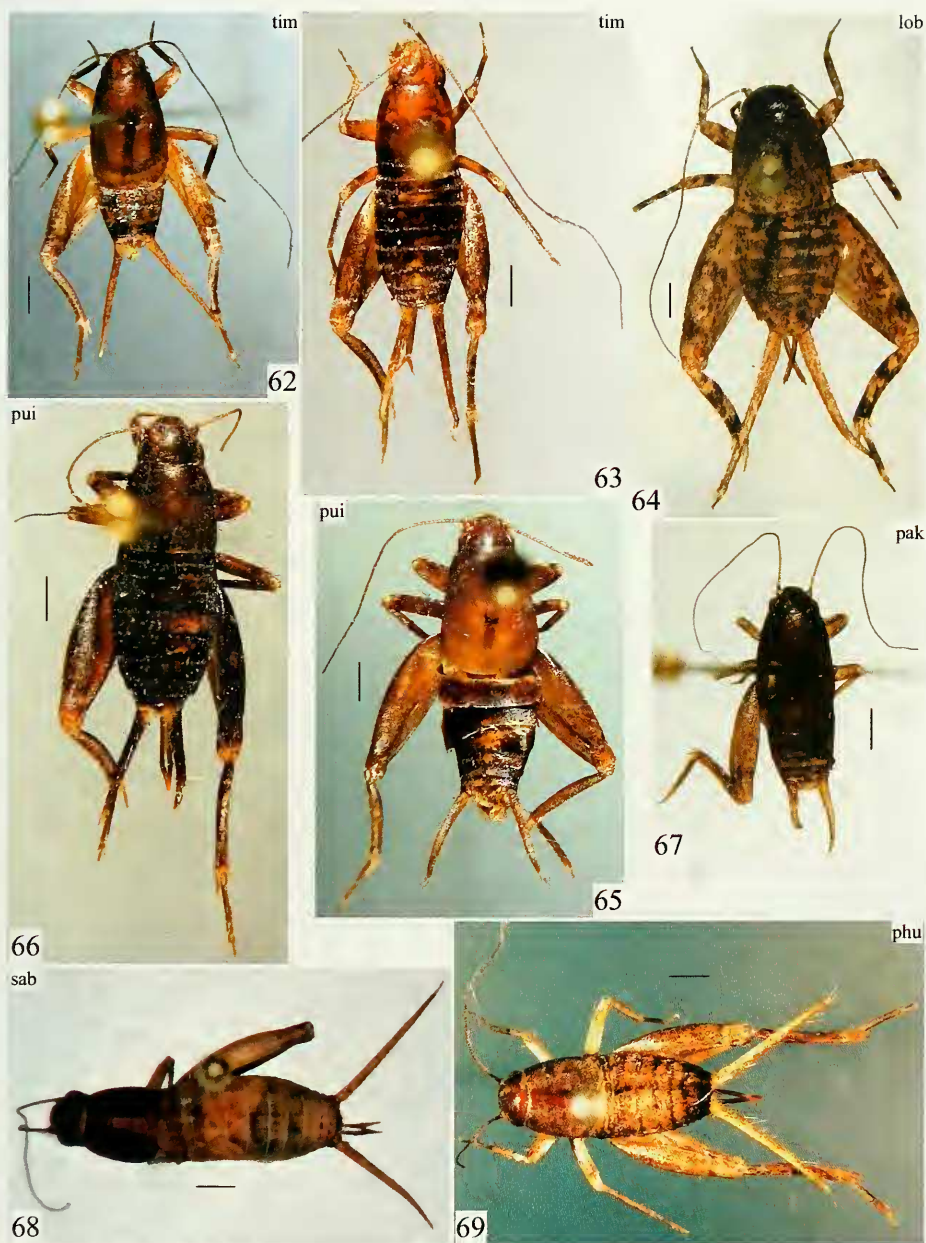
FIGS 31-41. Male tegmen of *Ornebius* and *Gotwendia* species: 31, *O. aureus* sp. n. HT; 32, *O. cibodas* sp. n. HT; 33, *O. brevipalpus* sp. n. HT; 34, *O. citrus* sp. n. PT; 35, *O. peniculatus* sp. n. HT; 36, *O. tuberculatus* sp. n. HT; 37, *O. dumoga* sp. n. PT; 38, *O. consternus* sp. n. ♂ HT; 39, *O. samudra* sp. n. HT; 40, *O. pullus* sp. n. HT; 41, *G. erawan* sp. n. HT.



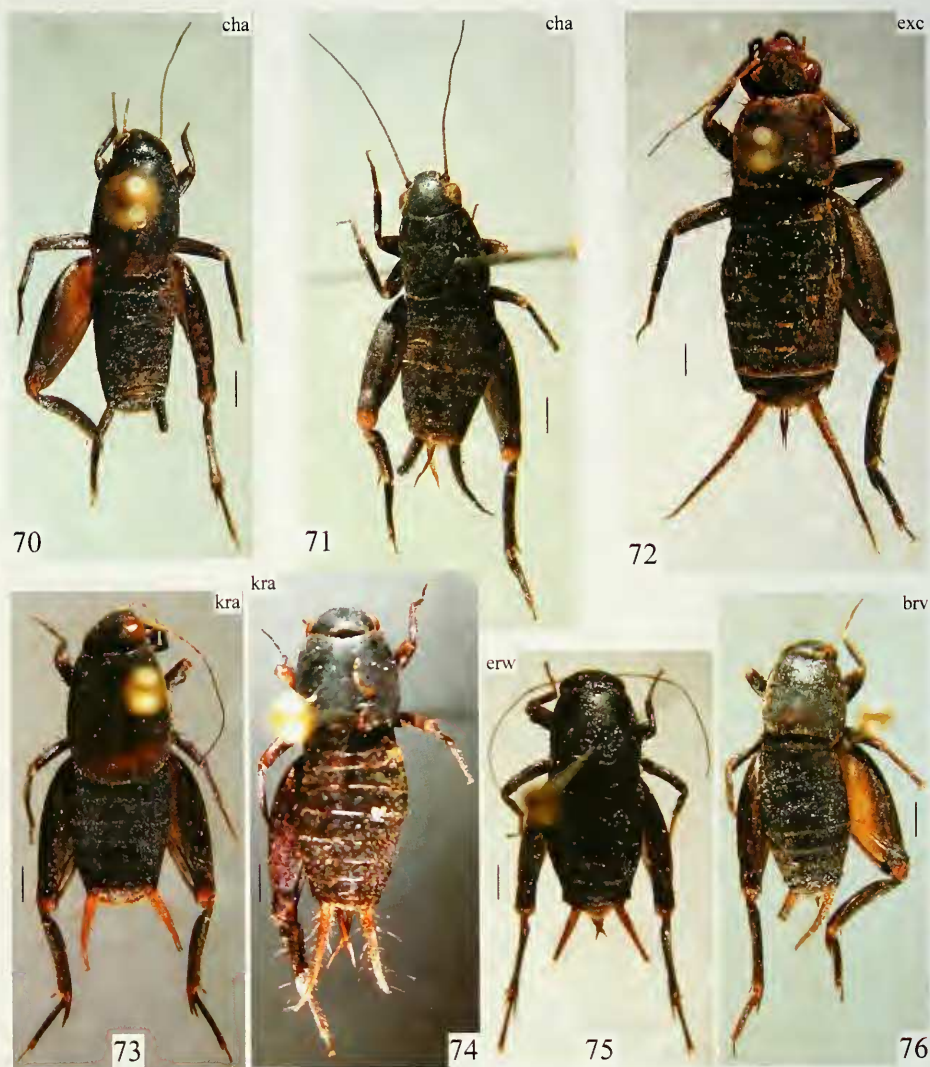


FIGS 48-61. Habitus of *Micronebius* species: 48, *M. incertus* (Ingrisch, 1998) ♂ (Sorinsim); 49, do. ♀; 50, *M. gracilicornis* (Chopard, 1969) ♂ (Palabuan Ratu); 51, do. ♀; 52, *M. maninjau* sp. n. ♂ HT; 53, do. ♀ PT; 54, *M. inopinatus* sp. n. ♂ HT; 55, *M. cylindricus* sp. n. ♂ HT; 56, do. ♀ PT; 57, *M. lineatus* sp. n. ♂ HT; 58, *M. laem* sp. n. ♂ HT; 59, *M. insularis* sp. n. ♂ HT; 60, do. ♀ PT; 61, *M. spec.* ♀ (Bukit Timah). Scales = 1 mm.

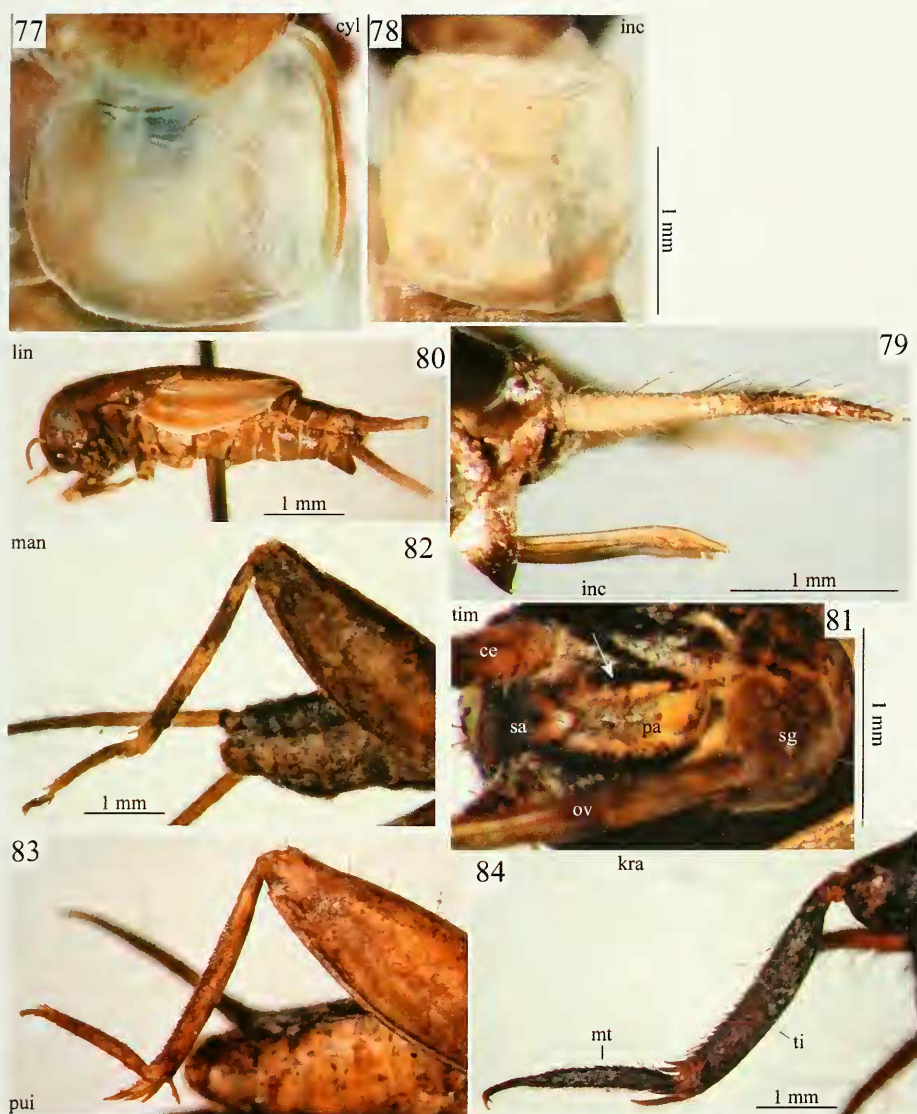




FIGS 62-69. Habitus of *Cycloptiloides* species: 62, *C. timah* sp. n. ♂ HT; 63, do. ♀ PT; 64, *C. lobicauda* sp. n. ♀ HT; 65, *C. pui* sp. n. ♂ HT; 66, do. ♀ PT; 67, *C. pakchong* sp. n. ♂ HT; 68, *C. sp.* 1 ♀; 69, *C. sp.* 2 ♀. Scales = 1 mm.

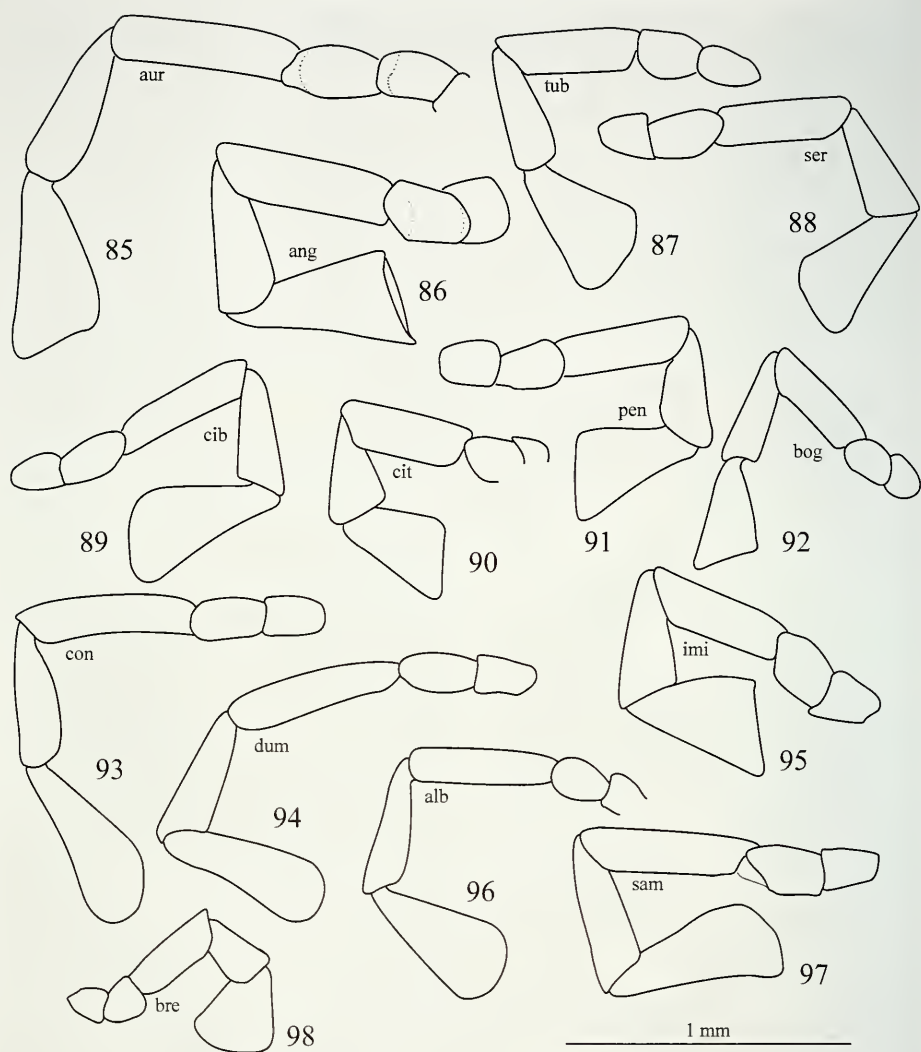


FIGS 70-76. Habitus of *Terraplistes* species: 70, *T. chantri* sp. n. ♂ HT; 71, do. ♀ PT; 72, *T. excisa* sp. n. ♀ HT; 73, *T. kradung* sp. n. ♂ HT; 74, do. ♀ PT; 75, *T. erawan* sp. n. ♀ HT; 76, *T. brevicauda* sp. n. ♀ HT. Scales = 1 mm.



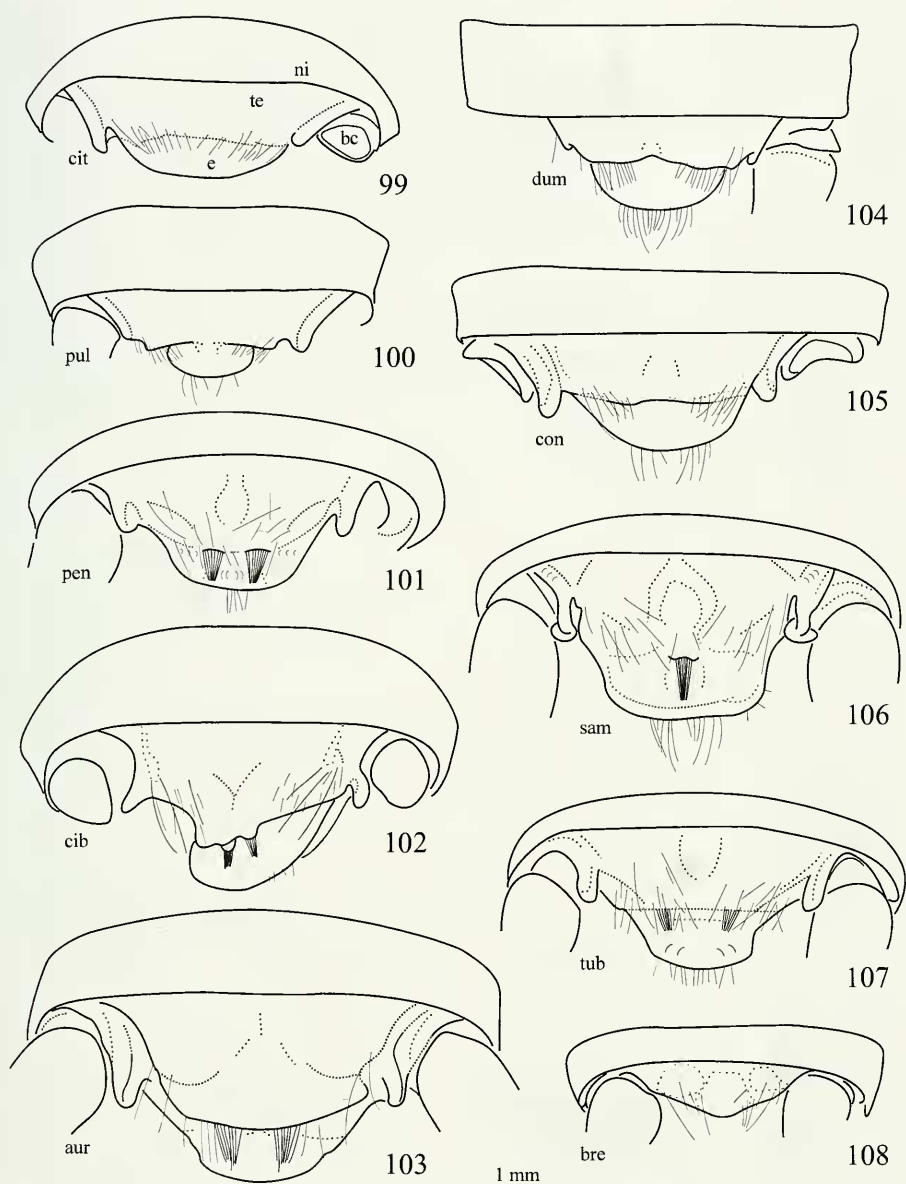
FIGS 77-84. Details of *Micronebius*, *Cycloptiloides* and *Terraplistes* species: 77, Tegmen of *M. cylindricus* sp. n. ♂ PT; 78, do. of *M. incertus* (Ingrisch, 1998) ♂ PT; 79, abdominal apex in lateral view of *M. incertus* ♀ (Sorinsim); 80, habitus lateral view of *M. lineatus* sp. n. ♂ HT; 81, abdominal apex in ventral view of *C. timah* sp. n. ♀ PT, the arrow points at the carina of the paraproct; 82, right hind leg of *M. maninjau* sp. n. ♂ HT; 83, do. of *C. pui* sp. n. ♂ HT; 84, do. of *T. kradung* sp. n. ♂ HT.



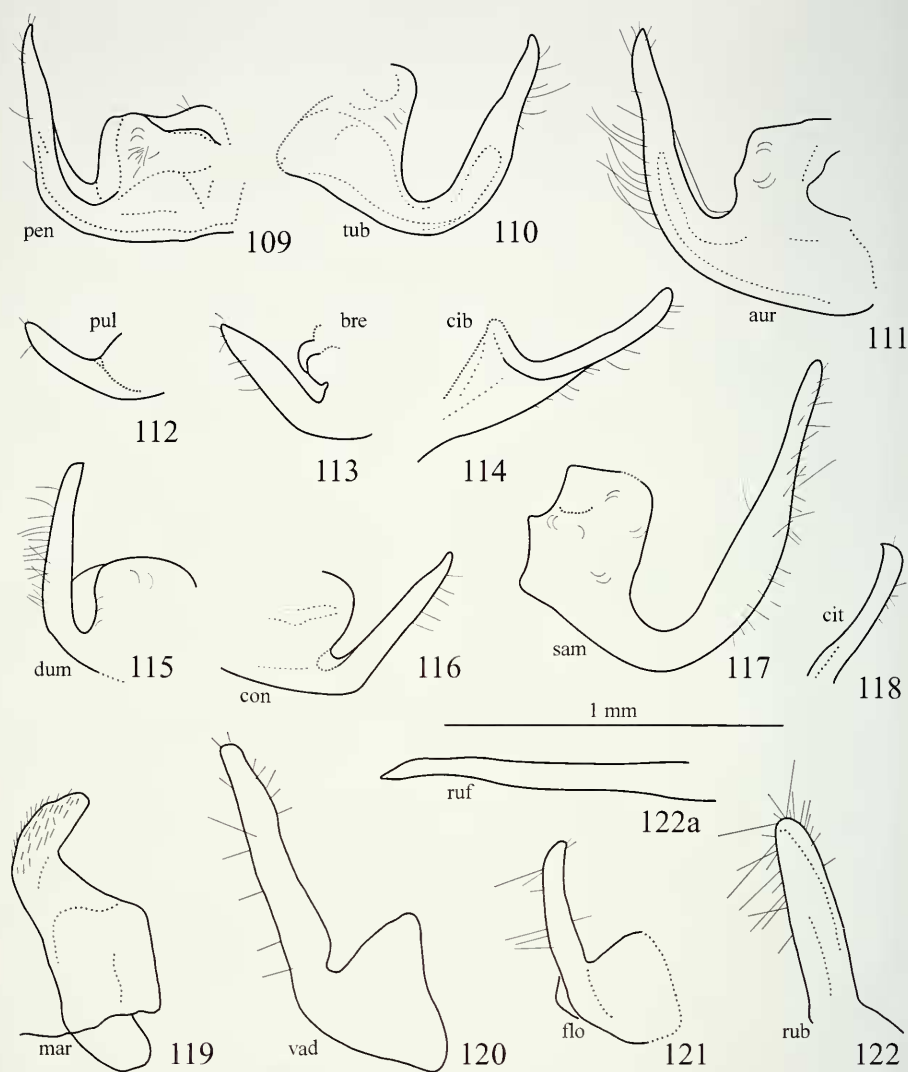


FIGS 85-98. Maxillary palps of *Ornebius* species: 85, *O. aureus* sp. n. ♂ HT; 86, *O. angustus* sp. n. ♀ HT; 87, *O. tuberculatus* sp. n. ♂ HT; 88, *O. serratus* sp. n. ♀ HT; 89, *O. cibodas* sp. n. ♂ HT; 90, *O. citrus* sp. n. ♂ PT; 91, *O. peniculatus* sp. n. ♂ HT; 92, *O. bogor* sp. n. ♀ HT; 93, *O. consternus* sp. n. ♂ PT; 94, *O. dumoga* sp. n. ♂ HT; 95, *O. imitatus* sp. n. ♀ HT; 96, *O. albipalpus* sp. n. ♀ HT; 97, *O. samudra* sp. n. ♂ HT; 98, *O. brevipalpus* sp. n. ♂ HT.

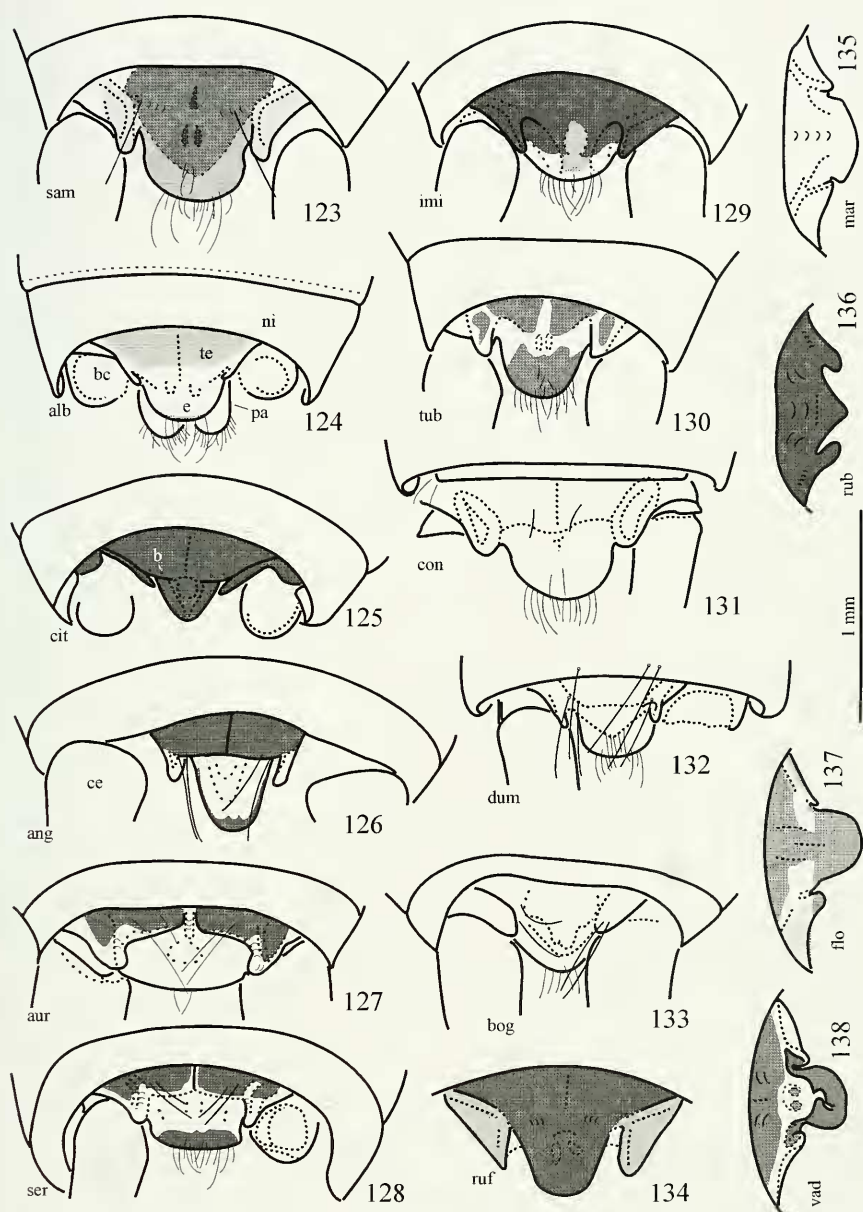




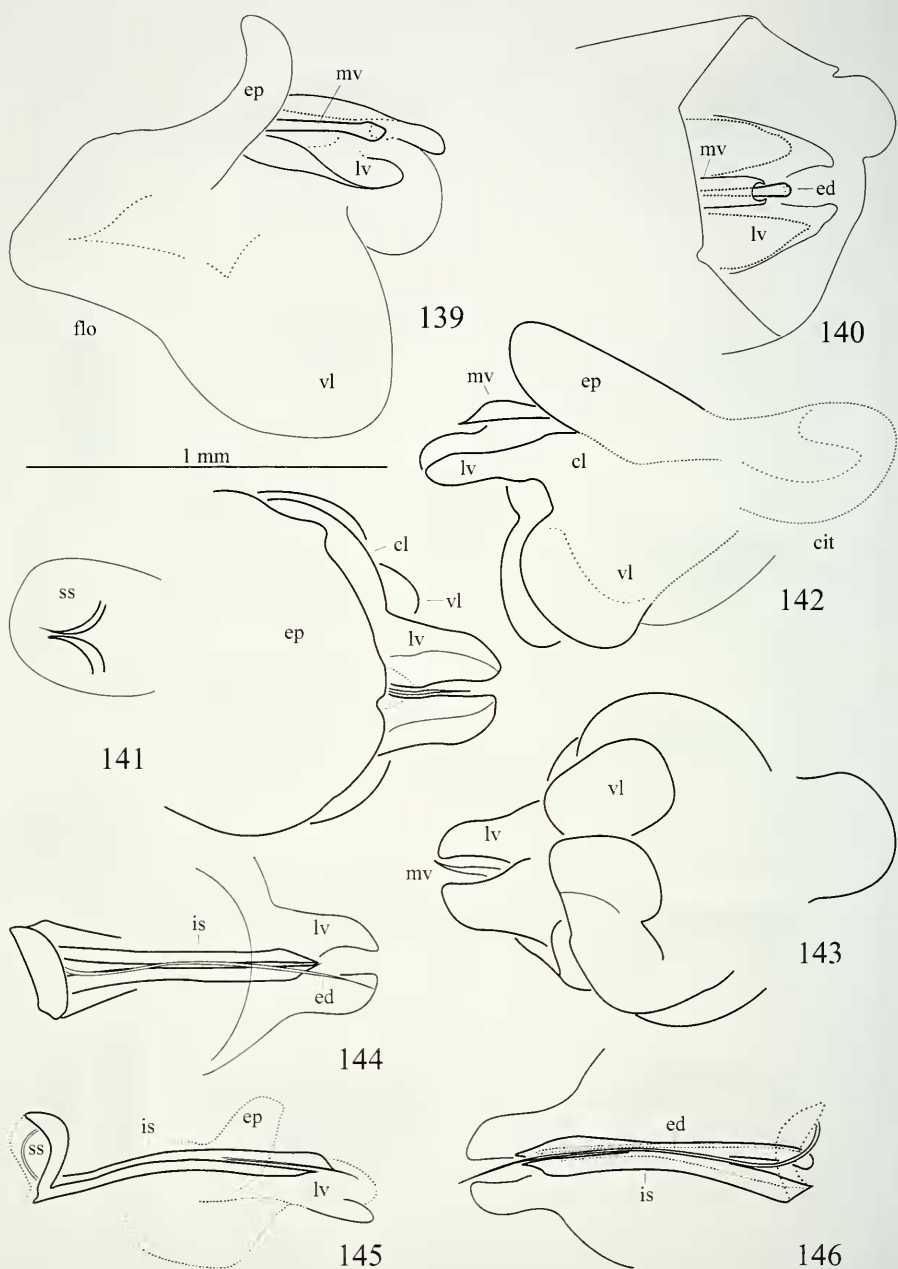
FIGS 99-108. Abdominal apex with supra-anal plate of *Ornebius* males: 99, *O. citrus* sp. n. PT; 100, *O. pullus* sp. n. HT; 101, *O. peniculatus* sp. n. HT; 102, *O. cibodas* sp. n. HT; 103, *O. aureus* sp. n. HT; 104, *O. dumoga* sp. n. HT; 105, *O. consternus* sp. n. PT; 106, *O. samudra* sp. n. HT; 107, *O. tuberculatus* sp. n. HT; 108, *O. brevipalpus* sp. n. HT.



FIGS 109-122. Male paraproct (112-113, 118, 122, process only) of *Ornebius* species: 109, *O. peniculatus* sp. n. HT; 110, *O. tuberculatus* sp. n. HT; 111, *O. aureus* sp. n. HT; 112, *O. pullus* sp. n. HT; 113, *O. brevipalpus* sp. n. HT; 114, *O. cibodas* sp. n. HT; 115, *O. dumoga* sp. n. HT; 116, *O. consternus* sp. n. PT; 117, *O. samudra* sp. n. HT; 118, *O. citrus* sp. n. PT; 119, *O. marginatus* Ingrisch, 1998; 120, *O. vadus* Ingrisch, 1998; 121, *O. flori* Ingrisch, 1998; 122, *O. rubidus* Ingrisch, 1998; 122a, *O. rufonigrus* Ingrisch, 1987.

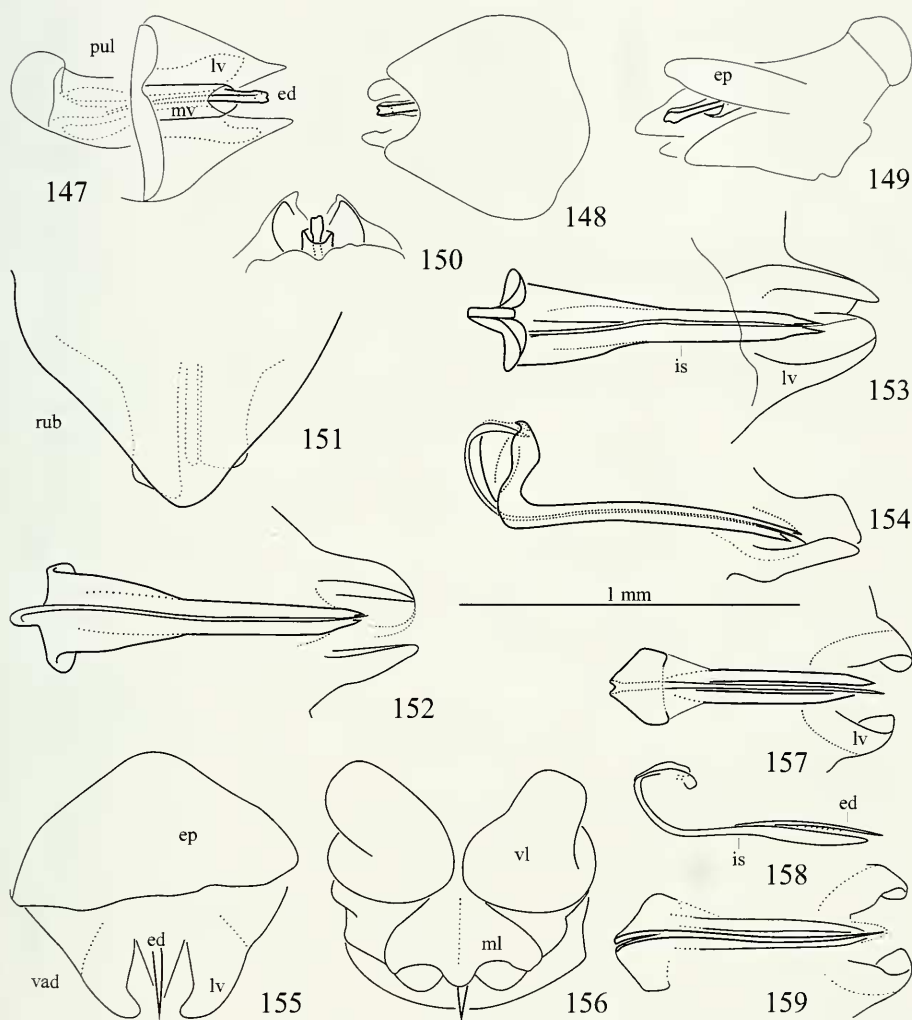


FIGS 123-138. Abdominal apex with supra-anal plate (134-138 supra-anal plate only) of *Ornebius* females: 123, *O. samudra* sp. n. PT; 124, *O. albipalpus* sp. n. HT; 125, *O. citrus* sp. n. PT (hairs broken, not drawn); 126, *O. angustus* sp. n. HT; 127, *O. aureus* sp. n. PT; 128, *O. serratus* sp. n. HT; 129, *O. imitatus* sp. n. HT; 130, *O. tuberculatus* sp. n. PT; 131, *O. consternus* sp. n. PT; 132, *O. dumoga* sp. n. PT; 133, *O. bogor* sp. n. HT; 134, *O. rufonigrus* Ingrisch, 1987 PT; 135, *O. marginatus* Ingrisch, 1998 PT; 136, *O. rubidus* Ingrisch, 1998 PT; 137, *O. flori* Ingrisch, 1998 PT; 138, *O. vadus* Ingrisch, 1998 PT. Colour pattern is indicated for the supra-anal plate only.

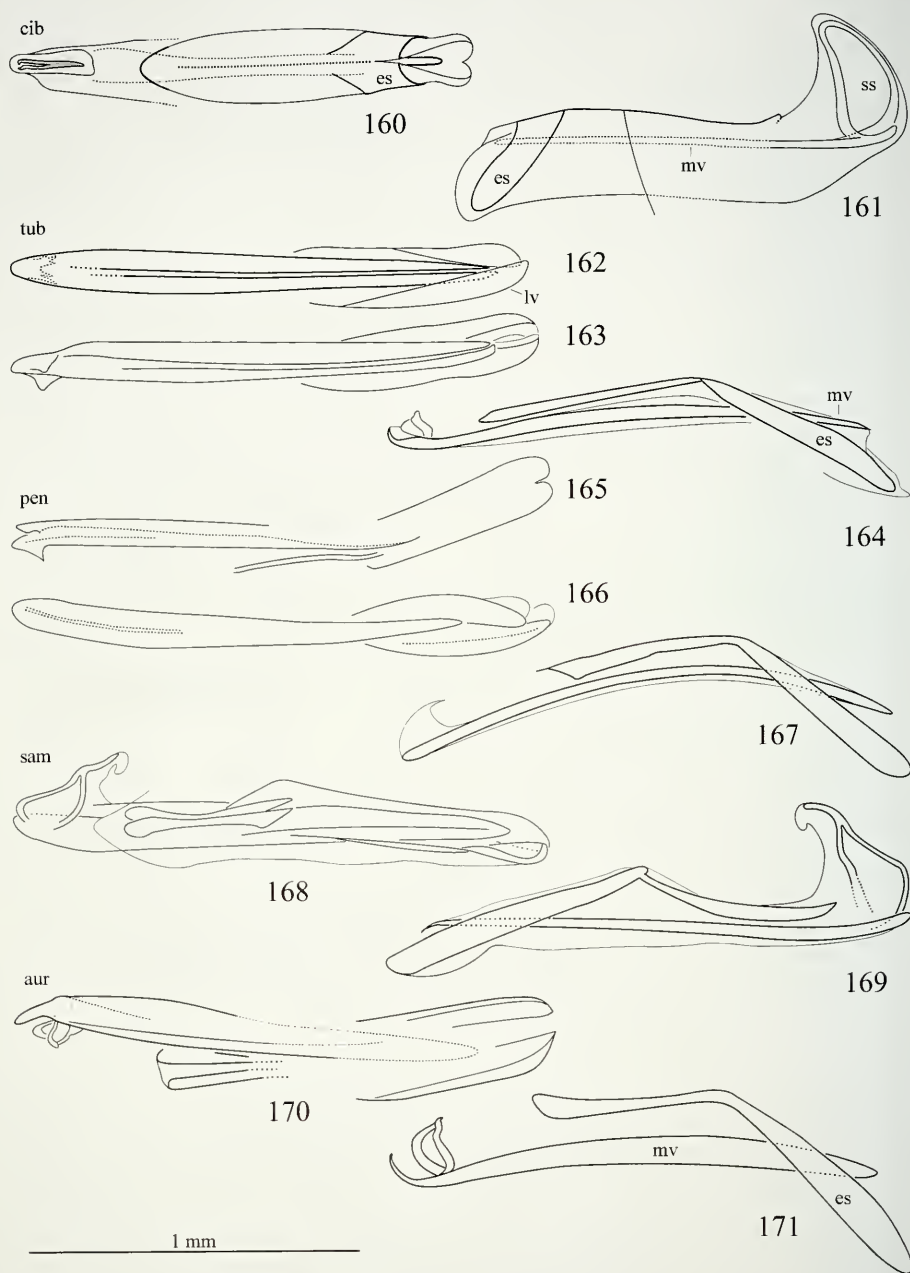


FIGS 139-146. Male phallic complex of *Ornebius* species: 139-140, *O. flori* Ingrisch, 1998 (Poring, Sorinsim); 141-146, *O. citrus* sp. n. PT. – 139-143, In situ of ethanol conserved specimens showing huge membranous parts; 144-146, after cleaning in KOH mainly sclerotised structures remain. – 139, 142, 145, Lateral view; 140, 141, 144, dorsal view; 143, 146, ventral view.

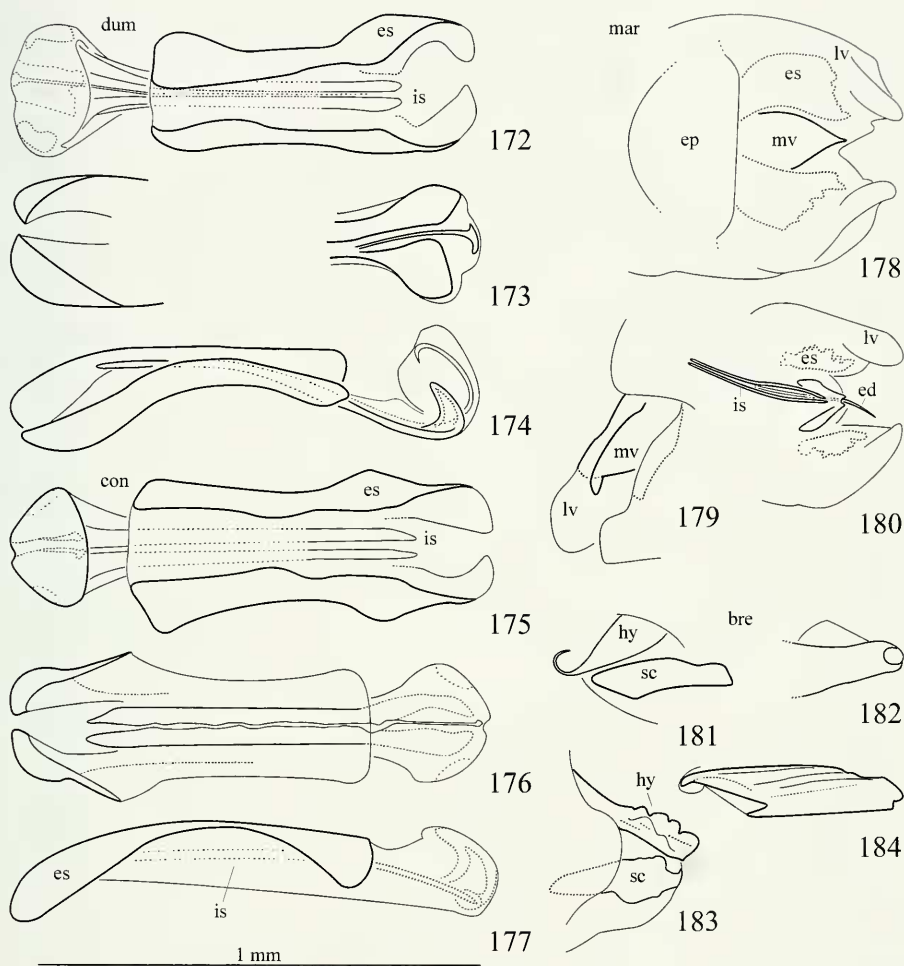




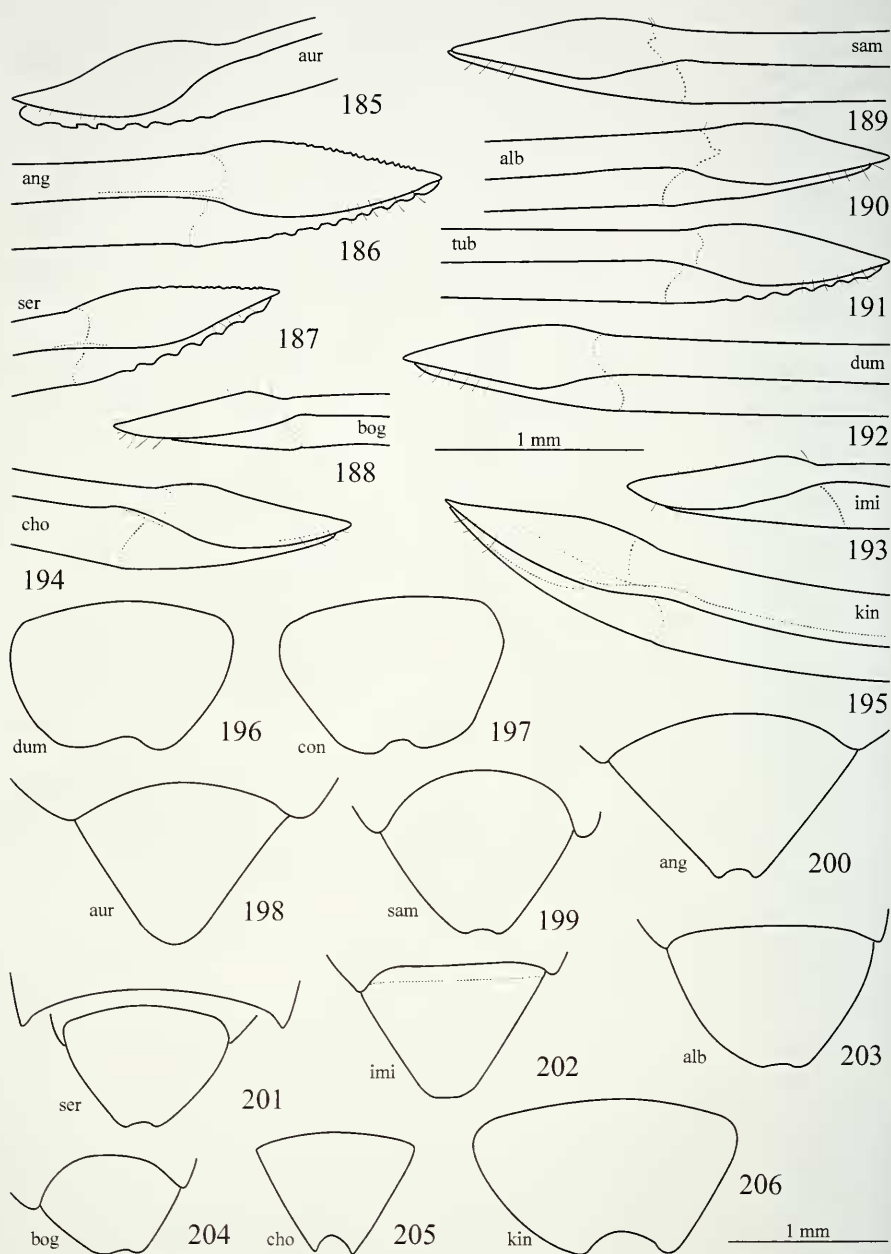
FIGS 147-159. Male phallic complex of *Ornebius* species: 147-150, *O. pullus* sp. n. HT; 151-154, *O. rubidus* Ingrisch, 1998 (Poring); 155-159, *O. vadus* Ingrisch, 1998 (Poring). – 147-151, 155-156, In situ of ethanol conserved specimens; 152-154, 157-159, after cleaning in KOH. – 147, 153, 155, 157, Dorsal view; 148, 151-152, 156, 159, ventral view; 149, latero-apical view; 150, apical view; 154, 158, lateral view.



FIGS 160-171. Male phallic complex of *Ornebius* species: 160-161, *O. cibodas* sp. n. HT; 162-164, *O. tuberculatus* sp. n. HT; 165-167, *O. peniculatus* sp. n. HT; 168-169, *O. samudra* sp. n. HT; 170-171, *O. aureus* sp. n. HT. – All after cleaning in KOH. – 160, 162, 165, 168, Dorsal view; 163, 166, 170, ventral view; 161, 164, 167, 169, 171, lateral view.

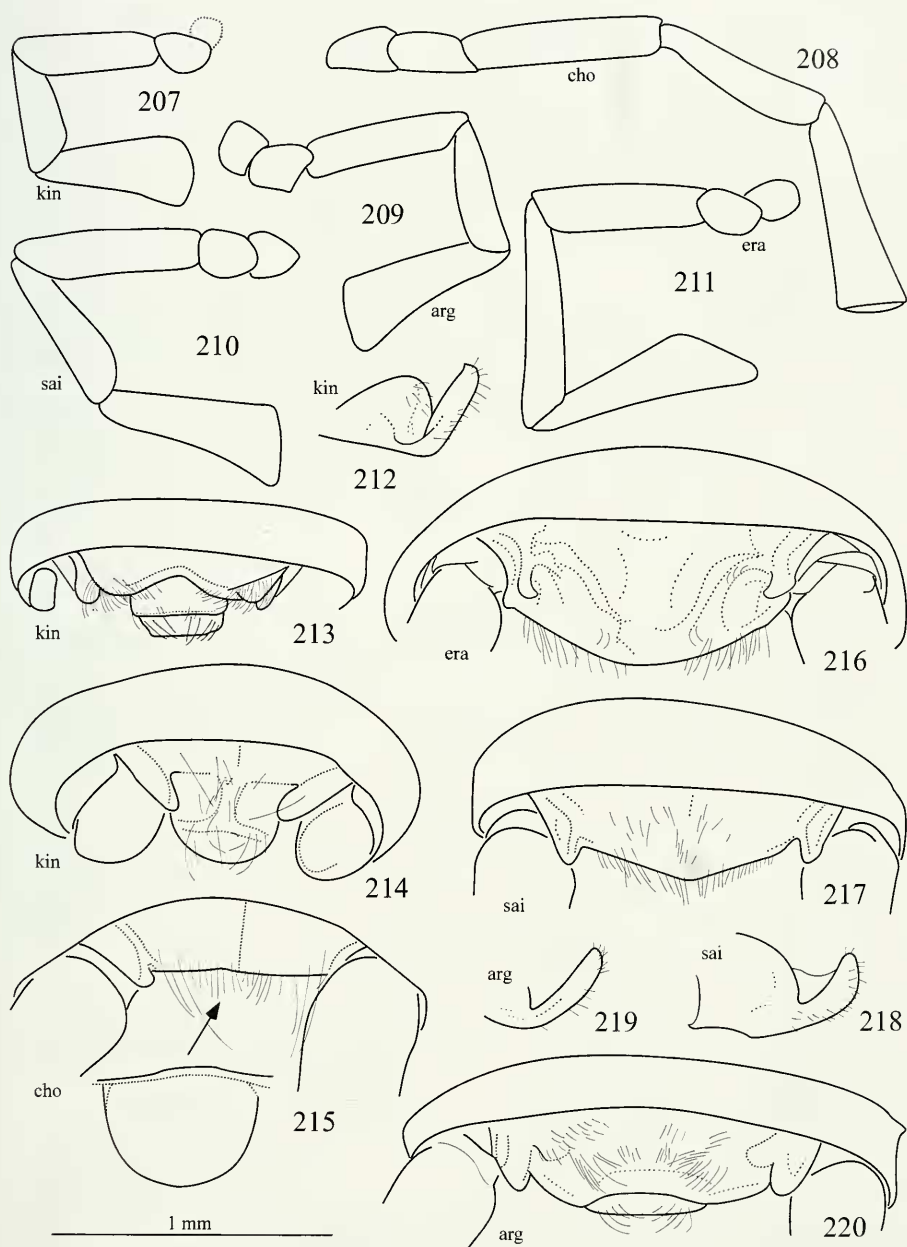


FIGS 172-184. Male phallic complex of *Ornebius* species: 172-174, *O. dumoga* sp. n. PT; 175-177, *O. consternus* sp. n. PT; 178-180, *O. marginatus* Ingrisch, 1998 (178-179, Poring; 180, Crocker Range); 181-184, *O. brevipalpus* sp. n. HT. – 178-179, In situ of ethanol conserved specimens; 172-177, 180-184, after cleaning in KOH. – 172, 175, 178, 180, 181, Dorsal view; 173, 176, 183, ventral view; 174, 177, 179, 182, lateral view; 184, separate right sclerite.

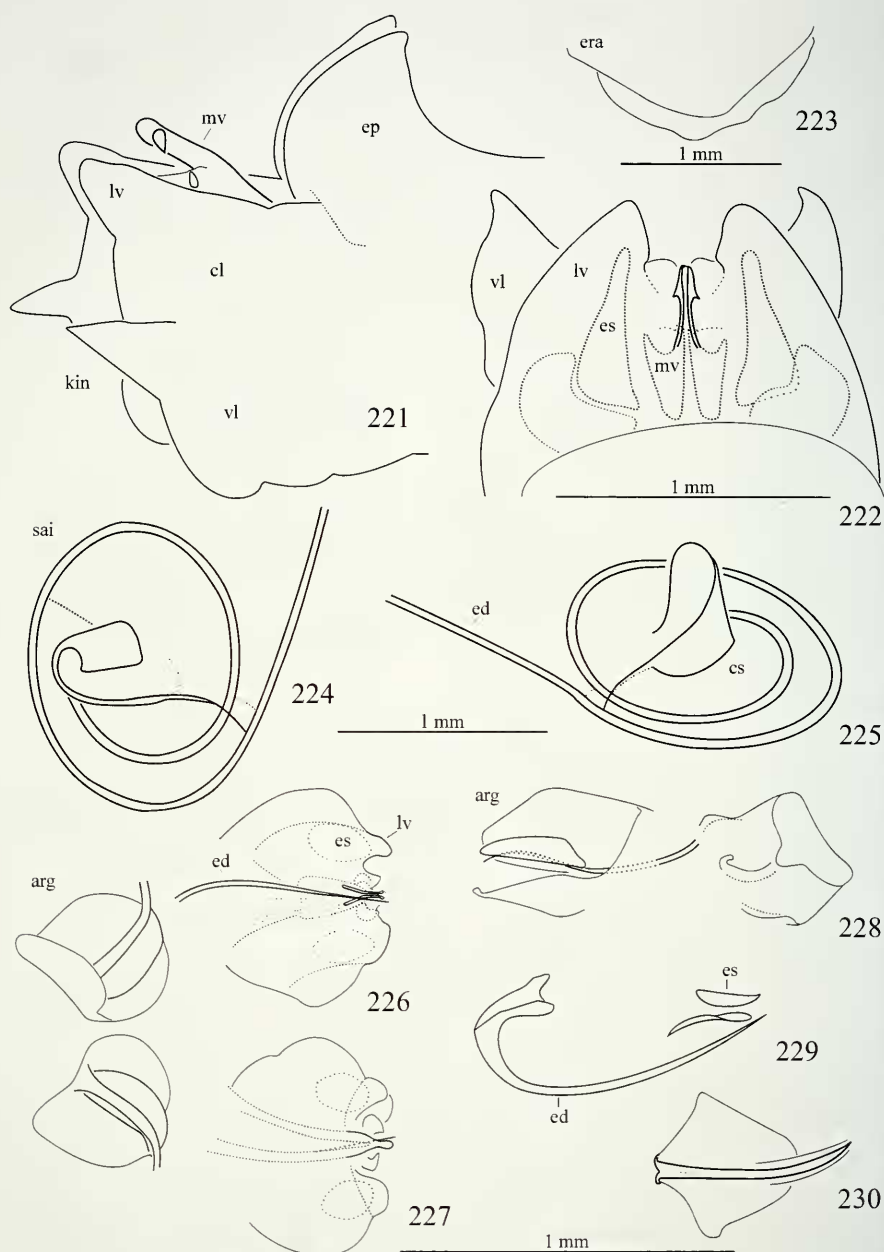


FIGS 185-206. Apical area of ovipositor (185-195) and subgenital plate (196-206) of *Ornebius* and *Apterornebius* females: 185, 198, *O. aureus* sp. n. PT; 186, 200, *O. angustus* sp. n. HT; 187, 201, *O. serratus* sp. n. HT; 188, 204, *O. bogor* sp. n. HT; 189, 199, *O. samudra* sp. n. PT; 190, 203, *O. albipalpus* sp. n. HT; 191, *O. tuberculatus* sp. n. PT; 192, 196, *O. dumoga* sp. n. PT; 193, 202, *O. imitatus* sp. n. HT; 194, 205, *A. chong* sp. n. HT; 195, 206, *A. kinabalu* sp. n. PT; 197, *O. consternus* sp. n. PT.

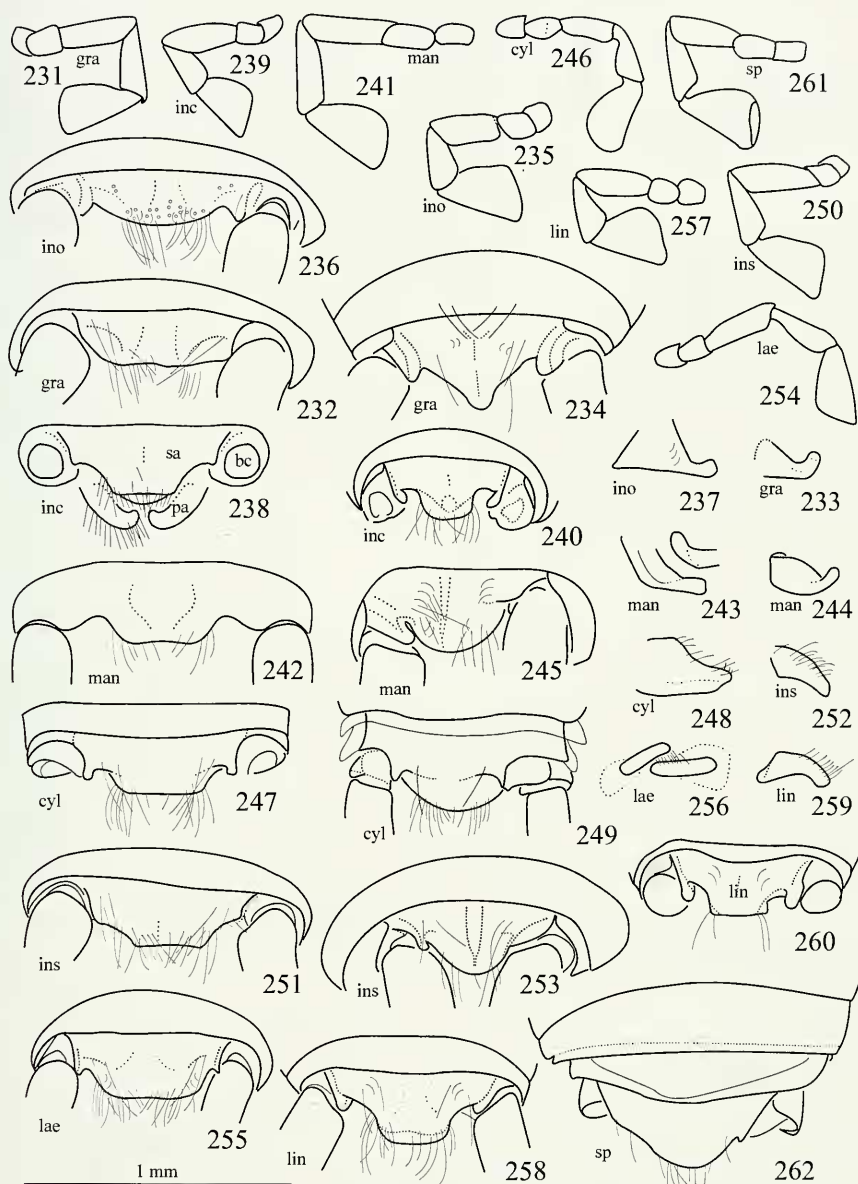




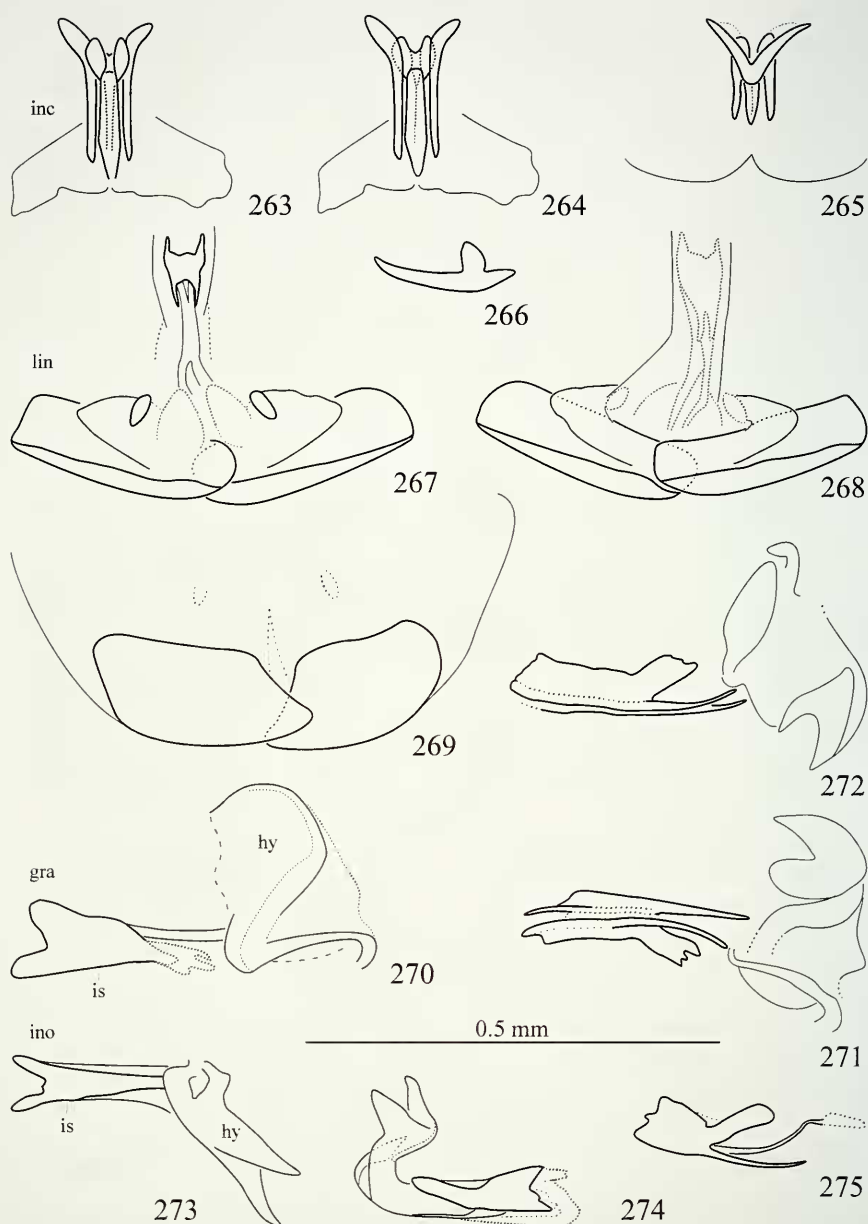
FIGS 207-220. Maxillary palps (207-211), abdominal apex with supra-anal plate (213-217, 220) and male paraproct (212, 218-219) of *Apterornebius*, *Ectatoderus* and *Gotwendia* species: 207, 212-213, *A. kinabalu* sp. n. ♂ PT; 214, do. ♀ PT; 208, 215, *A. chong* sp. n. ♀ HT (in 215 epiproct strongly bent downwards and drawn separately); 209, 219-220, *E. argentatus* sp. n. ♂ PT (220, apex of supra-anal plate artificially upcurved in preparation); 210, 217-218, *E. samui* sp. n. ♂ HT; 211, 216, *G. erawan* sp. n. ♂ HT.



FIGS 221-230. Male phallic complex of *Apterornebius*, *Gotwendia* and *Ectatoderus* species: 221-222, *A. kinabalu* sp. n. PT; 223, *G. erawan* sp. n. PT; 224-225, *E. samui* sp. n. HT; 226-230, *E. argentatus* sp. n. ♂ PT. – 221-223, 226-228, In situ of ethanol conserved specimens; 224-225, 229-230, after cleaning in KOH. – 221, 228-229, Lateral view; 222-223, 226, dorsal view; 224, left side; 225, right side; 227, ventral view [226-228, basal part of phallic complex broken off during preparation and not in same orientation as remainder of phallus]; 230, ventro-basal view.

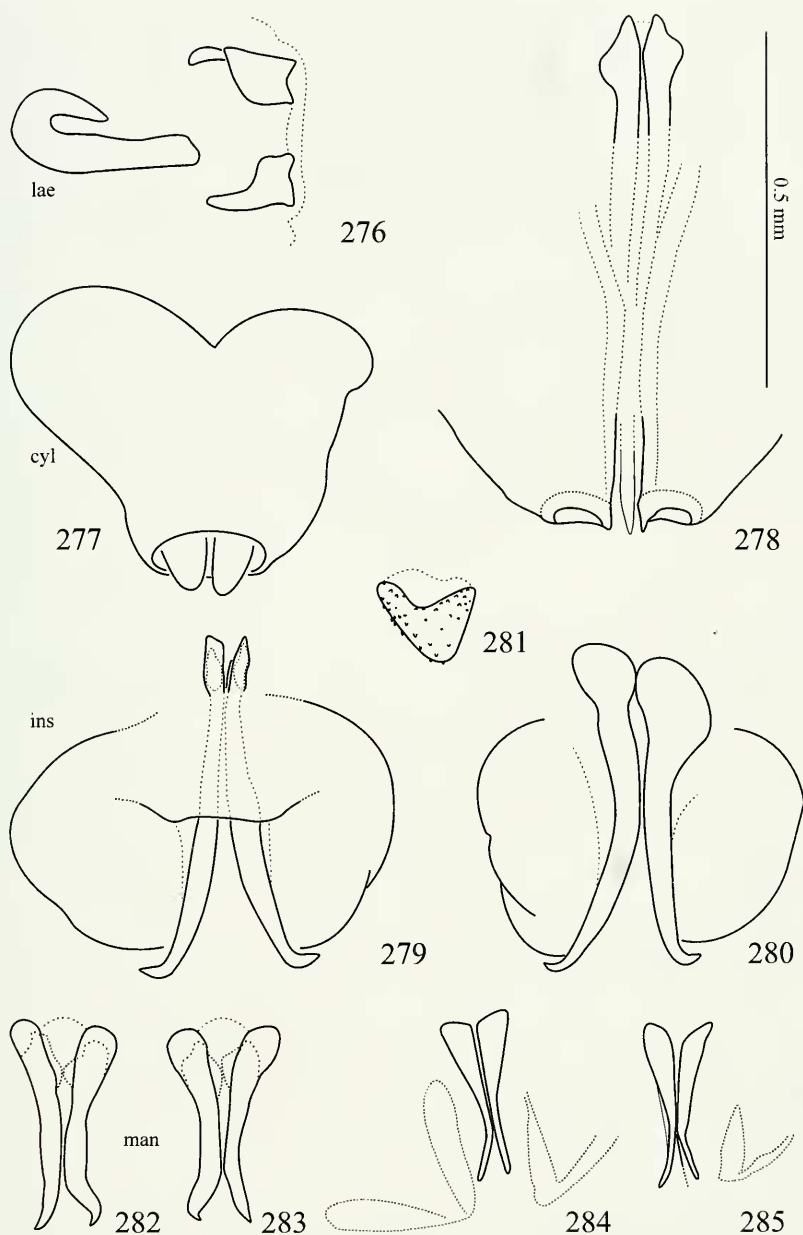


FIGS 231-262. Maxillary palps (231, 235, 239, 241, 246, 250, 254, 257, 261), abdominal apex with supra-anal plate (232, 236, 238, 242, 247, 251, 255, 258, ♂; 234, 240, 245, 249, 253, 258, 260, 262, ♀) and male paraproct (233, 237, 243, 244, 248, 252, 256, 259) of *Micrornebius* species: 231-233, *M. gracilicornis* (Chopard, 1969) ♂ (Palabuan Ratu); 234, do. ♀; 235-237, *M. inopinatus* sp. n. ♂ HT; 238, *M. incertus* (Ingrisch, 1998) ♂ HT; 239-240, do. ♀ (Sorinsim); 241-243, *M. maninjau* sp. n. ♂ HT; 244, do. ♂ PT; 245, do. ♀ PT; 246-248, *M. cylindricus* sp. n. ♂ HT; 249, do. ♀ PT; 250-252, *M. insularis* sp. n. ♂ HT; 253, do. ♀ PT; 254-256, *M. laem* sp. n. ♂ HT; 257, *M. lineatus* sp. n. ♂ PT; 258-259, do. ♂ HT; 260, do. ♀ PT; 261-262, *M. spec.* ♀ (Bukit Timah).

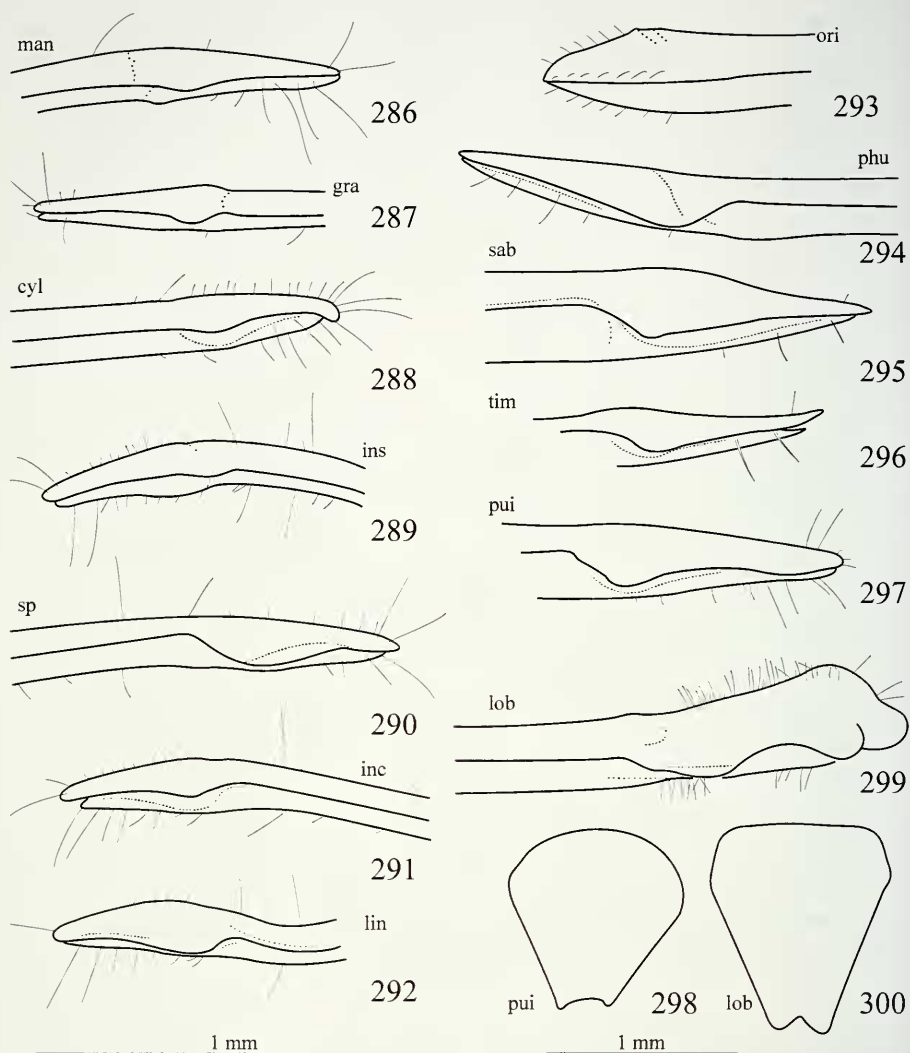


FIGS 263-275. Male phallic complex of *Micrornebius* species: 263-266, *M. incertus* (Ingrisch, 1998) HT; 267-268, *M. lineatus* sp. n. HT; 269, do. PT; 270-272, *M. gracilicornis* (Chopard, 1969) (Palabuan Ratu); 273-275, *M. inopinatus* sp. n. HT. – 269 in situ of ethanol conserved specimen, others after cleaning in KOH. – 263, 267, 270, 273, dorsal view; 264, 268, ventral view; 265, dorso-anterior view; 266, 272, 275, lateral view; 269, oblique apical view; 271, ventro-lateral view; 274, dorso-lateral view.

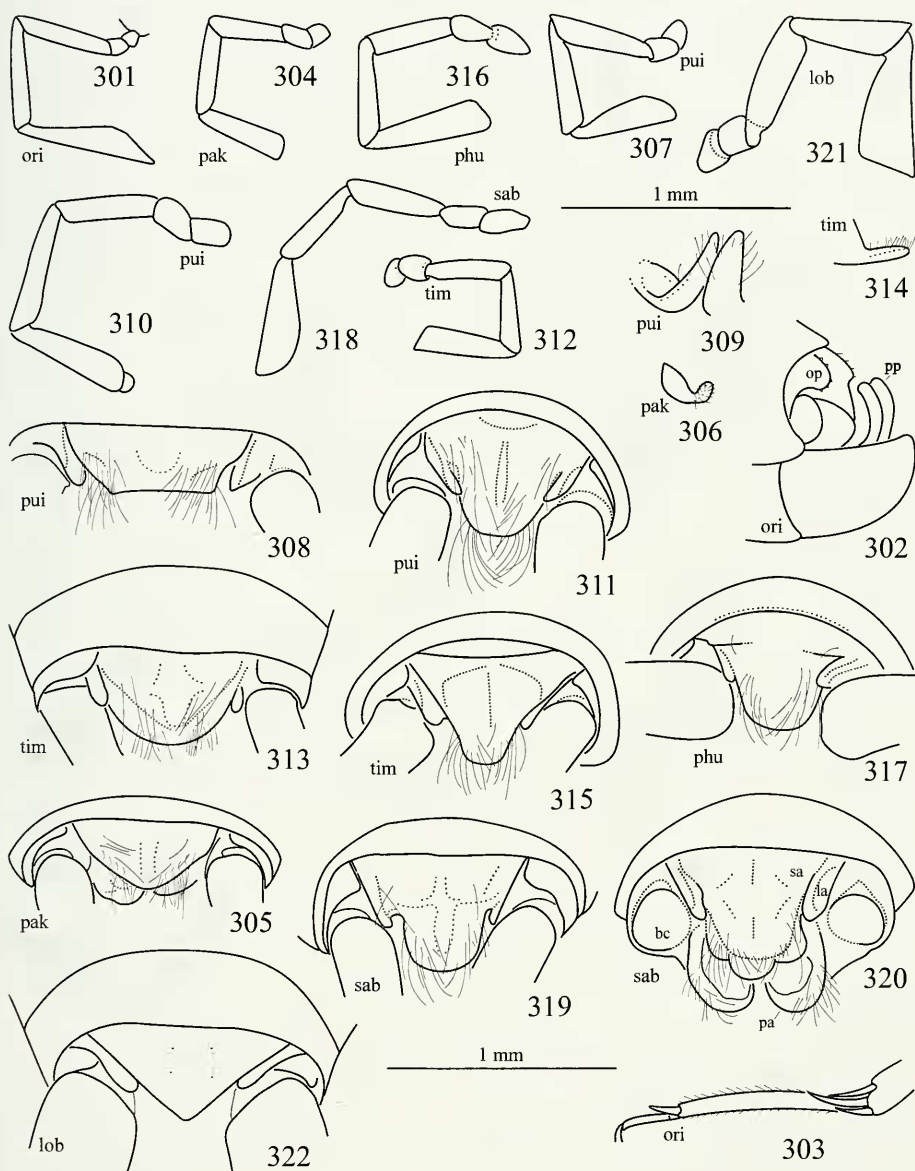




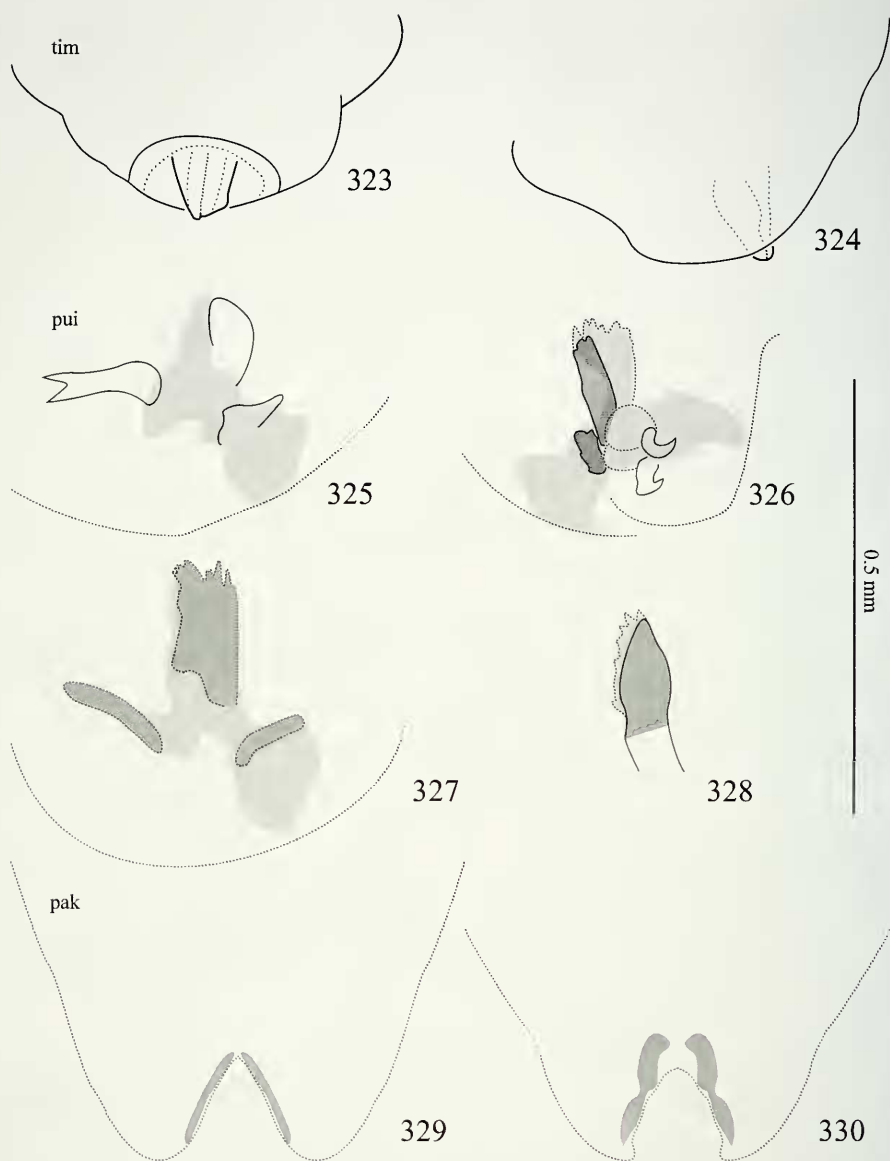
FIGS 276-285. Male phallic complex of *Micronebius* species: 276, *M. laem* sp. n. HT; 277-278, *M. cylindricus* sp. n. HT; 279-281, *M. insularis* sp. n. HT; 282-283, *M. maninjau* sp. n. HT; 284-285, do. PT. All after cleaning in KOH. – 276, Dorso-lateral view; 277, cylindrical shape of external membranous phallus; 278, external membranous structure cut and opened; 279, 282, 284, dorsal view; 280, 283, 285, ventral view; 281, epiphallus sclerite.



FIGS 286-300. Apical area of ovipositor (286-297, 299) and female subgenital plate (298, 300) of *Micromnebius* and *Cycloptiloides* species: 286, *M. maninjau* sp. n. PT; 287, *M. gracilicornis* (Chopard, 1969) (Palabuan Ratu); 288, *M. cylindricus* sp. n. PT; 289, *M. insularis* sp. n. PT; 290, *M. spec.* (Bukit Timah); 291, *M. incertus* (Ingrisch, 1998) (Sorinsim); 292, *M. lineatus* sp. n. PT; 293, *C. orientalis* (Chopard, 1925); 294, *C. sp. 2*; 295, *C. sp. 1*; 296, *C. timah* sp. n. PT; 297-298, *C. pui* sp. n. PT; 299-300, *C. lobicauda* sp. n. HT. – 293 from Chopard (1925) probably syntype, not to scale.

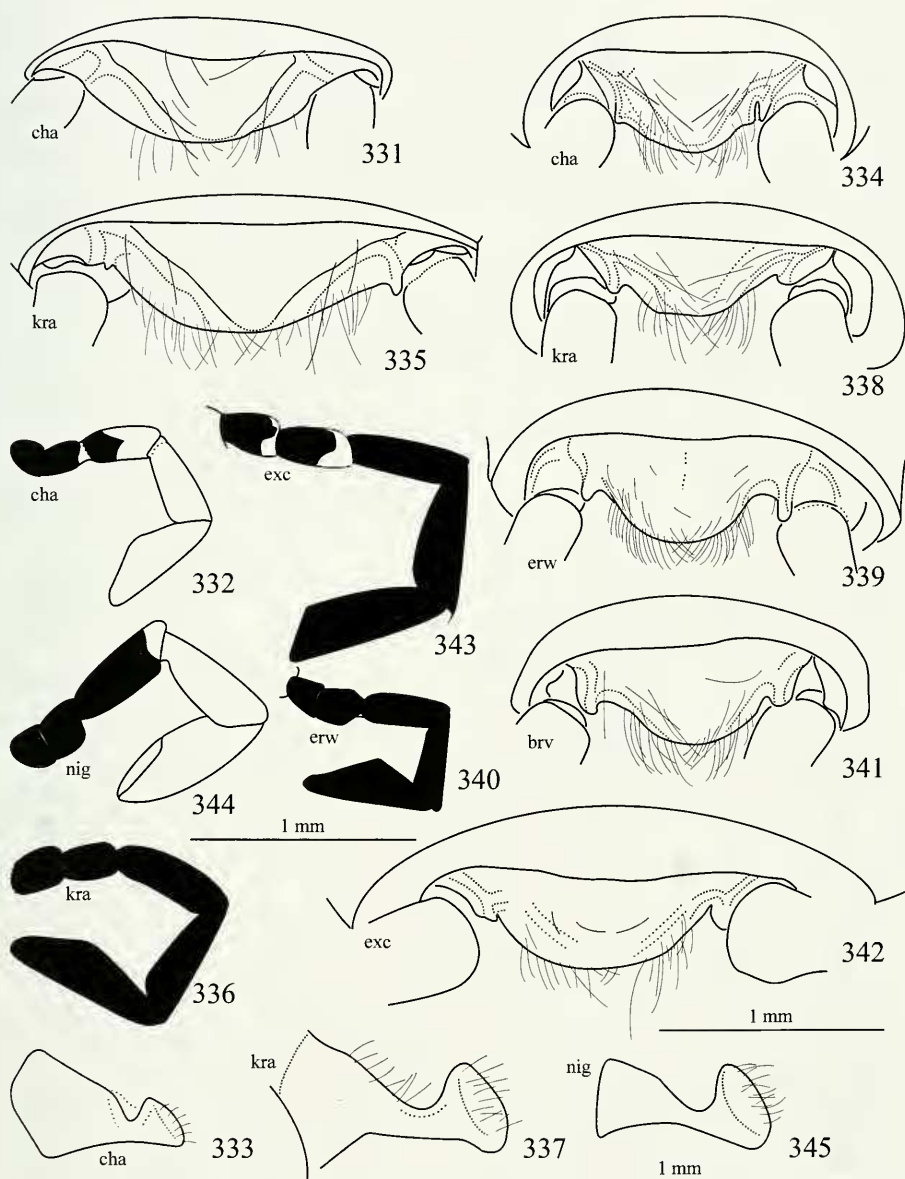


FIGS 301-322. Details of *Cycloptiloides* species: 301-303, *C. orientalis* (Chopard, 1925) ♂: 304-306, *C. pakchong* sp. n. ♂ HT; 307-309, *C. pui* sp. n. ♂ HT; 310-311, do. ♀ PT; 312-313, *C. timah* sp. n. ♂ HT; 314, do. ♂ PT; 315, do. ♀ PT; 316-317, *C. sp.* 2 ♀; 318-319, *C. sp.* 1 ♀ (Poring); 320, do. ♀ (Sepilok); 321-322, *C. lobicauda* sp. n. ♀ HT. – 301, 304, 307, 310, 312, 316, 318, 321, Maxillary palps; 302, apex of abdomen ♂ lateral view; 303, hind tarsus; 305, 308, 311, 313, 315, 317, 319, 320, 322, apex of abdomen with supra-anal plate (305, 308, 313, ♂; 311, 315, 317, 319, 320, 322, ♀); 306, 309, 314, male paraproct. – 301-303, from Chopard (1925) probably syntype, not to scale.

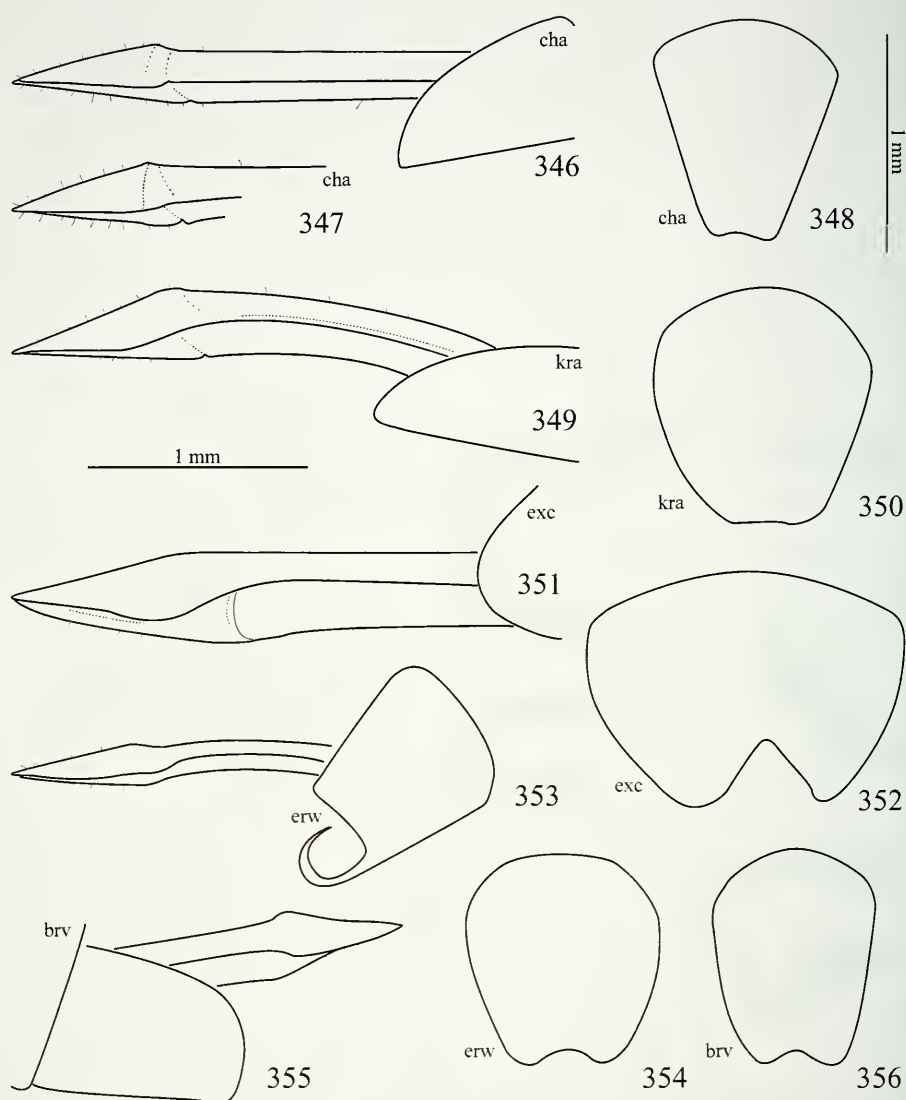


FIGS 323-330. Male phallic complex of *Cycloptiloides* species: 323-324, *C. timah* sp. n. ♂ HT; 325-328, *C. pui* sp. n. ♂ HT; 329-330, *C. pakchong* sp. n. ♂ HT. – 323, 329, Dorsal view; 324, 330, ventral view; 325-327, view from different angles on the minute sclerites; 328, separate central sclerite in lateral view.

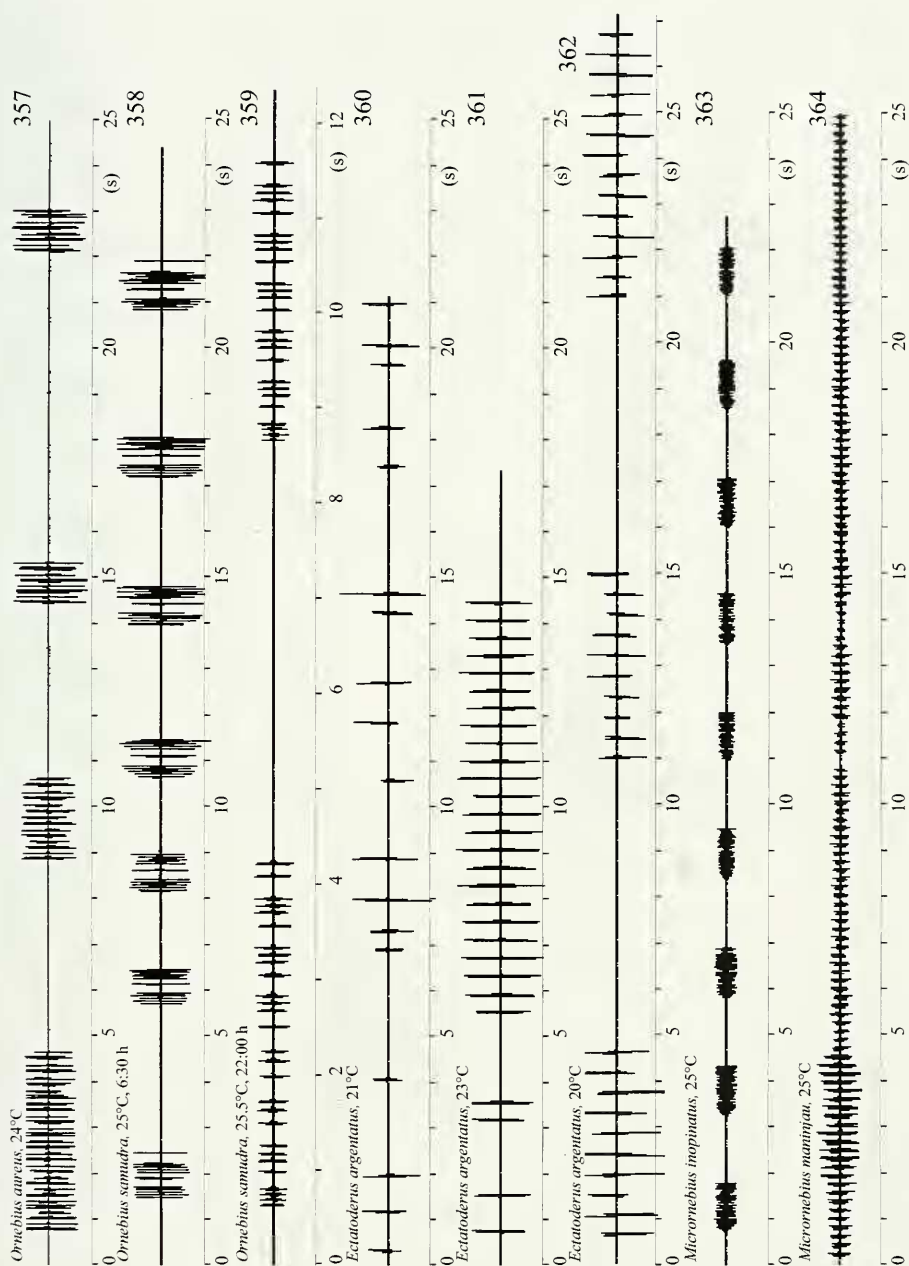




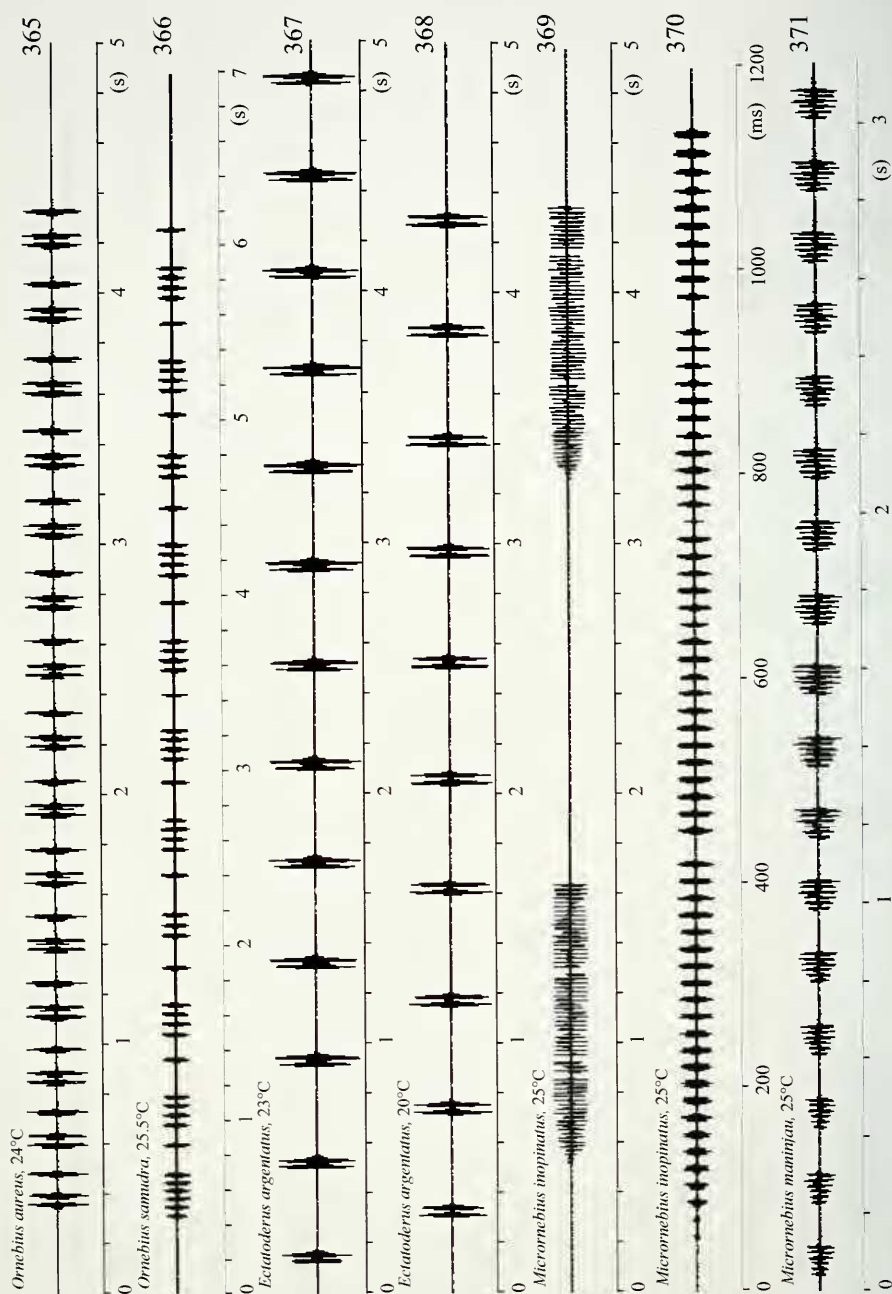
FIGS 331-345. Details of *Terraplistes* species: 331-333, *T. chantri* sp. n. ♂ HT; 334, do. ♀ PT; 335-337, *T. kradung* sp. n. ♂ HT; 338, do. ♀ PT; 339-340, *T. erawan* sp. n. ♀ HT; 341, *T. brevicauda* sp. n. ♀ HT; 342-343, *T. excisa* sp. n. ♀ HT; 344-345, *T. niger* (Ingrisch, 1987) ♂ HT. — 331, 334-335, 338-339, 341-342, Apex of abdomen with supra-anal plate (331, 335, ♂; 334, 338-339, 341-342, ♀); 332, 336, 340, 343-344, maxillary palps; 333, 337, 345, male paraproct.



FIGS 346-356. Ovipositor (346-347, 349, 351, 353, 355) and female subgenital plate (348, 350, 352, 354, 356) of *Terraplistes* species: 346-348, *T. chantri* sp. n. paratypes (2 specimens); 349-350, *T. kradung* sp. n. PT; 351-352, *T. excisa* sp. n. HT; 353-354, *T. erawan* sp. n. HT; 355-356, *T. brevicauda* sp. n. HT.

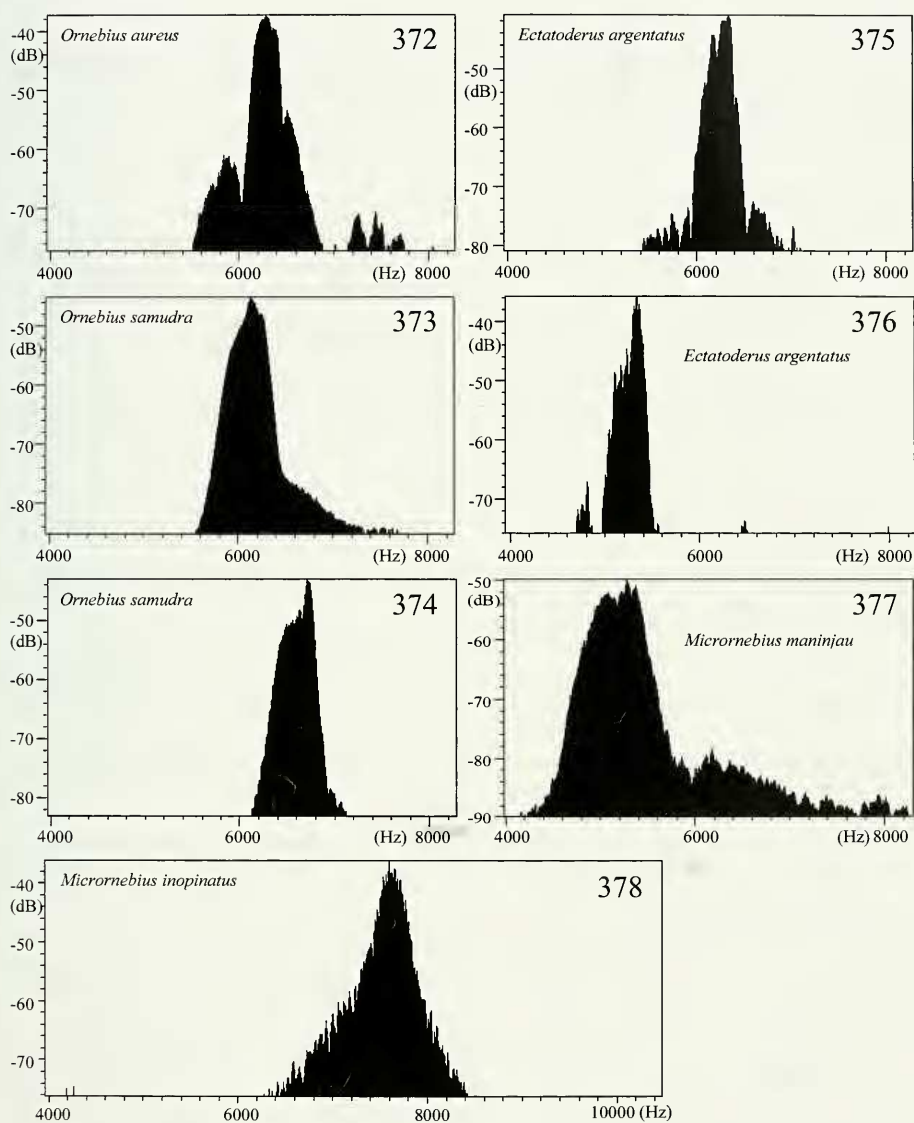


FIGS 357-364. Oscillograms of ♂ calling songs of Mogoplistinae; overview: 357, *Ornebius aureus* sp. n. HT at 24°C; 358, *Ornebius samudra* sp. n. PT at 25°C, 6:30 h; 359, do. at 25.5°C 22:00 h; 360, *Ectatoderus argentatus* sp. n. HT at 21°C, 4:00 h; 361, do. at 23°C, 3:30 h; 362, do. PT at 20°C 4:00 h; 363, *Micronebius inopinatus* sp. n. HT at 25°C, artificial diffuse light; 364, *Micronebius maninjau* sp. n. HT at 25°C, 2:30 h. All except 363 recorded in darkness.



FIGS 365-371. Oscillograms of ♂ calling songs of Mogoplistinae; chirp pattern at greater time resolution: 365, *Ornebius aureus* sp. n.; 366, *Ornebius samudra* sp. n.; 367, *Ectatoderus argentatus* sp. n. HT; 368, do. PT; 369-370, *Micromnebius inopinatus* sp. n.; 371, *Micromnebius maninjau* sp. n. – Details as in figs 357-364.





FIGS 372-378. Spectrograms of ♂ calling songs of Mogoplistinae: 372, *Ornebius aureus* sp. n.; 373-374, *Ornebius samudra* sp. n.; 375, *Ectatoderus argentatus* sp. n. HT; 376, do. PT; 377, *Micronebius maninjau* sp. n.; 378, *Micronebius inopinatus* sp. n. – Details as in figs 357-364.

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## ABBREVIATIONS USED IN FIGURES:

av	apical valves of ovipositor	mt	hind metatarsus
b	base of broken bristle	mv	medial valve of central phallic lobe
bc	base of cercus	ni	ninth abdominal tergite
ce	cercus	op	obtuse projection
cl	central lobe of phallic complex	ov	ovipositor
cs	central spiral of medial valve	pa	paraproct
e	epiproct	pp	paraproct process
ed	ejaculatory duct	PT	paratype
ep	epiphallus	sa	supra anal plate
es	external sclerite of lateral valve	sc	scapus (Figs 15-16)
fr	frontal rostrum	sc	sclerotised structure (Figs 181-183)
HT	holotype	sg	subgenital plate
hy	hyaline structure	ss	spermatophore sac
is	internal sclerite of medial valve	te	tenth abdominal tergite
la	lateral appendage of tenth abdominal tergite	ti	hind tibia
lv	lateral valve of central phallic lobe	ty	tibial tympanum
		vl	ventral lobe of phallic complex

## SPECIES ACRONYMS:

alb	<i>Ornebius albipalpus</i> sp. n.	kin	<i>Apterornebius kinabalu</i> sp. n.
ang	<i>Ornebius angustus</i> sp. n.	kra	<i>Terraplistes kradung</i> sp. n.
arg	<i>Ectatoderus argentatus</i> sp. n.	lae	<i>Micronebius laem</i> sp. n.
aur	<i>Ornebius aureus</i> sp. n.	lin	<i>Micronebius lineatus</i> sp. n.
bog	<i>Ornebius bogor</i> sp. n.	lob	<i>Cycloptiloides lobicauda</i> sp. n.
bre	<i>Ornebius brevipalpus</i> sp. n.	man	<i>Micronebius maninjau</i> sp. n.
brv	<i>Terraplistes brevicauda</i> sp. n.	mar	<i>Ornebius marginatus</i> Ingrisch, 1998
cha	<i>Terraplistes chantri</i> sp. n.	nig	<i>Terraplistes niger</i> (Ingrisch, 1987)
cho	<i>Apterornebius chong</i> sp. n.	ori	<i>Cycloptiloides orientalis</i> Chopard, 1925
cib	<i>Ornebius cibodas</i> sp. n.	pak	<i>Cycloptiloides pakchong</i> sp. n.
cit	<i>Ornebius citrus</i> sp. n.	pen	<i>Ornebius peniculatus</i> sp. n.
con	<i>Ornebius consternus</i> sp. n.	phu	<i>Cycloptiloides</i> sp. 2
cyl	<i>Micronebius cylindricus</i> sp. n.	pui	<i>Cycloptiloides pui</i> sp. n.
dum	<i>Ornebius dumoga</i> sp. n.	pul	<i>Ornebius pullus</i> sp. n.
era	<i>Gotvandia erawan</i> sp. n.	rub	<i>Ornebius rubidus</i> Ingrisch, 1998
erw	<i>Terraplistes erawan</i> sp. n.	ruf	<i>Ornebius rufonigrus</i> Ingrisch, 1987
exc	<i>Terraplistes excisa</i> sp. n.	sab	<i>Cycloptiloides</i> sp. 1
flo	<i>Ornebius flori</i> Ingrisch, 1998	sai	<i>Ectatoderus samui</i> sp. n.
gra	<i>Micronebius gracilicornis</i> Chopard, 1969	sam	<i>Ornebius samudra</i> sp. n.
imi	<i>Ornebius imitatus</i> sp. n.	ser	<i>Ornebius serratus</i> sp. n.
inc	<i>Micronebius incertus</i> (Ingrisch, 1998)	sp	<i>Micronebius</i> sp.
ino	<i>Micronebius inopinatus</i> sp. n.	tim	<i>Cycloptiloides timah</i> sp. n.
ins	<i>Micronebius insularis</i> sp. n.	tub	<i>Ornebius tuberculatus</i> sp. n.
		vad	<i>Ornebius vadus</i> Ingrisch, 1998

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